

# Report

User :atharvyelmar

Name :Atharv Mahesh Yelmar

Email ID :atharvyelmar@rediffmail.com

University/College Name :



## Experiment No. 7

October 30, 2021, 7:18 pm

### Calibration Of Singly Constrained Gravity Model (Origin)

Input Values :

| Base Year Origin-Destination Cost Matrix |             |      |
|------------------------------------------|-------------|------|
| Origin                                   | Destination | Cost |
| 1                                        | 1           | 28   |
| 1                                        | 2           | 23   |
| 1                                        | 3           | 28   |
| 1                                        | 4           | 24   |
| 1                                        | 5           | 31   |
| 1                                        | 6           | 35   |
| 1                                        | 7           | 31   |
| 1                                        | 8           | 41   |
| 1                                        | 9           | 22   |
| 1                                        | 10          | 38   |



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|   |    |    |
|---|----|----|
| 1 | 11 | 46 |
| 1 | 12 | 32 |
| 1 | 13 | 41 |
| 1 | 14 | 45 |
| 1 | 15 | 35 |
| 1 | 16 | 34 |
| 1 | 17 | 39 |
| 1 | 18 | 33 |
| 1 | 19 | 76 |
| 1 | 20 | 55 |
| 1 | 21 | 35 |
| 1 | 22 | 38 |
| 1 | 23 | 48 |
| 1 | 24 | 52 |
| 1 | 25 | 44 |



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|   |    |    |
|---|----|----|
| 1 | 26 | 41 |
|---|----|----|

| Origin | Destination | Cost |
|--------|-------------|------|
| 2      | 1           | 29   |
| 2      | 2           | 26   |
| 2      | 3           | 27   |
| 2      | 4           | 23   |
| 2      | 5           | 39   |
| 2      | 6           | 34   |
| 2      | 7           | 28   |
| 2      | 8           | 40   |
| 2      | 9           | 34   |
| 2      | 10          | 35   |
| 2      | 11          | 33   |
| 2      | 12          | 46   |



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|   |    |    |
|---|----|----|
| 2 | 13 | 31 |
| 2 | 14 | 47 |
| 2 | 15 | 33 |
| 2 | 16 | 20 |
| 2 | 17 | 71 |
| 2 | 18 | 45 |
| 2 | 19 | 35 |
| 2 | 20 | 46 |
| 2 | 21 | 45 |
| 2 | 22 | 35 |
| 2 | 23 | 50 |
| 2 | 24 | 60 |
| 2 | 25 | 67 |
| 2 | 26 | 43 |



| Origin | Destination | Cost |
|--------|-------------|------|
| 3      | 1           | 31   |
| 3      | 2           | 31   |
| 3      | 3           | 20   |
| 3      | 4           | 24   |
| 3      | 5           | 28   |
| 3      | 6           | 29   |
| 3      | 7           | 24   |
| 3      | 8           | 27   |
| 3      | 9           | 24   |
| 3      | 10          | 29   |
| 3      | 11          | 30   |
| 3      | 12          | 33   |
| 3      | 13          | 40   |
| 3      | 14          | 36   |



|   |    |    |
|---|----|----|
| 3 | 15 | 34 |
| 3 | 16 | 31 |
| 3 | 17 | 29 |
| 3 | 18 | 28 |
| 3 | 19 | 37 |
| 3 | 20 | 41 |
| 3 | 21 | 44 |
| 3 | 22 | 38 |
| 3 | 23 | 45 |
| 3 | 24 | 41 |
| 3 | 25 | 45 |
| 3 | 26 | 47 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 4      | 1           | 31   |



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|   |    |    |
|---|----|----|
| 4 | 2  | 24 |
| 4 | 3  | 24 |
| 4 | 4  | 20 |
| 4 | 5  | 24 |
| 4 | 6  | 29 |
| 4 | 7  | 24 |
| 4 | 8  | 28 |
| 4 | 9  | 27 |
| 4 | 10 | 33 |
| 4 | 11 | 30 |
| 4 | 12 | 34 |
| 4 | 13 | 38 |
| 4 | 14 | 36 |
| 4 | 15 | 33 |
| 4 | 16 | 42 |





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|   |    |    |
|---|----|----|
| 4 | 17 | 38 |
| 4 | 18 | 40 |
| 4 | 19 | 39 |
| 4 | 20 | 35 |
| 4 | 21 | 38 |
| 4 | 22 | 35 |
| 4 | 23 | 48 |
| 4 | 24 | 60 |
| 4 | 25 | 63 |
| 4 | 26 | 53 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 5      | 1           | 37   |
| 5      | 2           | 38   |
| 5      | 3           | 33   |



|   |    |    |
|---|----|----|
| 5 | 4  | 24 |
| 5 | 5  | 22 |
| 5 | 6  | 31 |
| 5 | 7  | 27 |
| 5 | 8  | 28 |
| 5 | 9  | 29 |
| 5 | 10 | 36 |
| 5 | 11 | 30 |
| 5 | 12 | 35 |
| 5 | 13 | 39 |
| 5 | 14 | 36 |
| 5 | 15 | 31 |
| 5 | 16 | 41 |
| 5 | 17 | 41 |
| 5 | 18 | 57 |



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|   |    |    |
|---|----|----|
| 5 | 19 | 41 |
| 5 | 20 | 49 |
| 5 | 21 | 56 |
| 5 | 22 | 43 |
| 5 | 23 | 39 |
| 5 | 24 | 47 |
| 5 | 25 | 52 |
| 5 | 26 | 53 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 6      | 1           | 40   |
| 6      | 2           | 35   |
| 6      | 3           | 29   |
| 6      | 4           | 31   |
| 6      | 5           | 33   |



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|   |    |    |
|---|----|----|
| 6 | 6  | 20 |
| 6 | 7  | 26 |
| 6 | 8  | 32 |
| 6 | 9  | 33 |
| 6 | 10 | 27 |
| 6 | 11 | 25 |
| 6 | 12 | 21 |
| 6 | 13 | 23 |
| 6 | 14 | 28 |
| 6 | 15 | 29 |
| 6 | 16 | 27 |
| 6 | 17 | 42 |
| 6 | 18 | 32 |
| 6 | 19 | 34 |
| 6 | 20 | 31 |



|   |    |    |
|---|----|----|
| 6 | 21 | 25 |
| 6 | 22 | 34 |
| 6 | 23 | 32 |
| 6 | 24 | 45 |
| 6 | 25 | 52 |
| 6 | 26 | 42 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 7      | 1           | 32   |
| 7      | 2           | 33   |
| 7      | 3           | 27   |
| 7      | 4           | 28   |
| 7      | 5           | 28   |
| 7      | 6           | 23   |
| 7      | 7           | 20   |



|   |    |    |
|---|----|----|
| 7 | 8  | 29 |
| 7 | 9  | 24 |
| 7 | 10 | 24 |
| 7 | 11 | 24 |
| 7 | 12 | 23 |
| 7 | 13 | 29 |
| 7 | 14 | 26 |
| 7 | 15 | 30 |
| 7 | 16 | 34 |
| 7 | 17 | 43 |
| 7 | 18 | 30 |
| 7 | 19 | 34 |
| 7 | 20 | 32 |
| 7 | 21 | 32 |
| 7 | 22 | 41 |



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|   |    |    |
|---|----|----|
| 7 | 23 | 30 |
| 7 | 24 | 38 |
| 7 | 25 | 39 |
| 7 | 26 | 37 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 8      | 1           | 41   |
| 8      | 2           | 39   |
| 8      | 3           | 25   |
| 8      | 4           | 25   |
| 8      | 5           | 32   |
| 8      | 6           | 32   |
| 8      | 7           | 26   |
| 8      | 8           | 25   |
| 8      | 9           | 25   |



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|   |    |    |
|---|----|----|
| 8 | 10 | 22 |
| 8 | 11 | 28 |
| 8 | 12 | 37 |
| 8 | 13 | 39 |
| 8 | 14 | 39 |
| 8 | 15 | 34 |
| 8 | 16 | 28 |
| 8 | 17 | 31 |
| 8 | 18 | 45 |
| 8 | 19 | 51 |
| 8 | 20 | 50 |
| 8 | 21 | 42 |
| 8 | 22 | 41 |
| 8 | 23 | 57 |
| 8 | 24 | 53 |





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|   |    |    |
|---|----|----|
| 8 | 25 | 48 |
| 8 | 26 | 47 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 9      | 1           | 24   |
| 9      | 2           | 34   |
| 9      | 3           | 23   |
| 9      | 4           | 24   |
| 9      | 5           | 40   |
| 9      | 6           | 30   |
| 9      | 7           | 25   |
| 9      | 8           | 27   |
| 9      | 9           | 19   |
| 9      | 10          | 22   |
| 9      | 11          | 26   |



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|   |    |    |
|---|----|----|
| 9 | 12 | 33 |
| 9 | 13 | 39 |
| 9 | 14 | 34 |
| 9 | 15 | 31 |
| 9 | 16 | 26 |
| 9 | 17 | 34 |
| 9 | 18 | 29 |
| 9 | 19 | 40 |
| 9 | 20 | 37 |
| 9 | 21 | 43 |
| 9 | 22 | 50 |
| 9 | 23 | 43 |
| 9 | 24 | 38 |
| 9 | 25 | 47 |
| 9 | 26 | 49 |



| Origin | Destination | Cost |
|--------|-------------|------|
| 10     | 1           | 39   |
| 10     | 2           | 29   |
| 10     | 3           | 30   |
| 10     | 4           | 29   |
| 10     | 5           | 38   |
| 10     | 6           | 25   |
| 10     | 7           | 20   |
| 10     | 8           | 27   |
| 10     | 9           | 22   |
| 10     | 10          | 20   |
| 10     | 11          | 23   |
| 10     | 12          | 25   |
| 10     | 13          | 34   |
| 10     | 14          | 38   |



|    |    |    |
|----|----|----|
| 10 | 15 | 27 |
| 10 | 16 | 25 |
| 10 | 17 | 37 |
| 10 | 18 | 25 |
| 10 | 19 | 35 |
| 10 | 20 | 37 |
| 10 | 21 | 37 |
| 10 | 22 | 45 |
| 10 | 23 | 41 |
| 10 | 24 | 46 |
| 10 | 25 | 40 |
| 10 | 26 | 48 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 11     | 1           | 50   |



|    |    |    |
|----|----|----|
| 11 | 2  | 47 |
| 11 | 3  | 30 |
| 11 | 4  | 31 |
| 11 | 5  | 33 |
| 11 | 6  | 23 |
| 11 | 7  | 24 |
| 11 | 8  | 28 |
| 11 | 9  | 26 |
| 11 | 10 | 23 |
| 11 | 11 | 20 |
| 11 | 12 | 23 |
| 11 | 13 | 25 |
| 11 | 14 | 24 |
| 11 | 15 | 26 |
| 11 | 16 | 22 |



|    |    |    |
|----|----|----|
| 11 | 17 | 30 |
| 11 | 18 | 31 |
| 11 | 19 | 30 |
| 11 | 20 | 28 |
| 11 | 21 | 29 |
| 11 | 22 | 37 |
| 11 | 23 | 31 |
| 11 | 24 | 36 |
| 11 | 25 | 37 |
| 11 | 26 | 33 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 12     | 1           | 35   |
| 12     | 2           | 40   |
| 12     | 3           | 35   |



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|    |    |    |
|----|----|----|
| 12 | 4  | 33 |
| 12 | 5  | 33 |
| 12 | 6  | 22 |
| 12 | 7  | 27 |
| 12 | 8  | 36 |
| 12 | 9  | 34 |
| 12 | 10 | 27 |
| 12 | 11 | 25 |
| 12 | 12 | 18 |
| 12 | 13 | 20 |
| 12 | 14 | 20 |
| 12 | 15 | 24 |
| 12 | 16 | 31 |
| 12 | 17 | 35 |
| 12 | 18 | 29 |



|    |    |    |
|----|----|----|
| 12 | 19 | 30 |
| 12 | 20 | 27 |
| 12 | 21 | 23 |
| 12 | 22 | 28 |
| 12 | 23 | 27 |
| 12 | 24 | 41 |
| 12 | 25 | 36 |
| 12 | 26 | 31 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 13     | 1           | 46   |
| 13     | 2           | 49   |
| 13     | 3           | 42   |
| 13     | 4           | 39   |
| 13     | 5           | 42   |





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|    |    |    |
|----|----|----|
| 13 | 6  | 23 |
| 13 | 7  | 30 |
| 13 | 8  | 39 |
| 13 | 9  | 40 |
| 13 | 10 | 34 |
| 13 | 11 | 27 |
| 13 | 12 | 21 |
| 13 | 13 | 18 |
| 13 | 14 | 20 |
| 13 | 15 | 28 |
| 13 | 16 | 33 |
| 13 | 17 | 40 |
| 13 | 18 | 32 |
| 13 | 19 | 33 |
| 13 | 20 | 25 |



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|    |    |    |
|----|----|----|
| 13 | 21 | 21 |
| 13 | 22 | 27 |
| 13 | 23 | 31 |
| 13 | 24 | 38 |
| 13 | 25 | 40 |
| 13 | 26 | 33 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 14     | 1           | 44   |
| 14     | 2           | 39   |
| 14     | 3           | 40   |
| 14     | 4           | 34   |
| 14     | 5           | 46   |
| 14     | 6           | 25   |
| 14     | 7           | 26   |



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|    |    |    |
|----|----|----|
| 14 | 8  | 35 |
| 14 | 9  | 38 |
| 14 | 10 | 27 |
| 14 | 11 | 23 |
| 14 | 12 | 18 |
| 14 | 13 | 19 |
| 14 | 14 | 15 |
| 14 | 15 | 19 |
| 14 | 16 | 25 |
| 14 | 17 | 35 |
| 14 | 18 | 34 |
| 14 | 19 | 20 |
| 14 | 20 | 20 |
| 14 | 21 | 23 |
| 14 | 22 | 27 |



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|    |    |    |
|----|----|----|
| 14 | 23 | 22 |
| 14 | 24 | 34 |
| 14 | 25 | 31 |
| 14 | 26 | 29 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 15     | 1           | 49   |
| 15     | 2           | 52   |
| 15     | 3           | 35   |
| 15     | 4           | 35   |
| 15     | 5           | 43   |
| 15     | 6           | 30   |
| 15     | 7           | 29   |
| 15     | 8           | 32   |
| 15     | 9           | 32   |



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|    |    |    |
|----|----|----|
| 15 | 10 | 29 |
| 15 | 11 | 24 |
| 15 | 12 | 24 |
| 15 | 13 | 29 |
| 15 | 14 | 20 |
| 15 | 15 | 21 |
| 15 | 16 | 24 |
| 15 | 17 | 26 |
| 15 | 18 | 28 |
| 15 | 19 | 26 |
| 15 | 20 | 27 |
| 15 | 21 | 27 |
| 15 | 22 | 32 |
| 15 | 23 | 25 |
| 15 | 24 | 30 |



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|    |    |    |
|----|----|----|
| 15 | 25 | 34 |
| 15 | 26 | 39 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 16     | 1           | 36   |
| 16     | 2           | 33   |
| 16     | 3           | 32   |
| 16     | 4           | 41   |
| 16     | 5           | 41   |
| 16     | 6           | 28   |
| 16     | 7           | 26   |
| 16     | 8           | 30   |
| 16     | 9           | 28   |
| 16     | 10          | 25   |
| 16     | 11          | 32   |



|    |    |    |
|----|----|----|
| 16 | 12 | 31 |
| 16 | 13 | 28 |
| 16 | 14 | 27 |
| 16 | 15 | 24 |
| 16 | 16 | 27 |
| 16 | 17 | 30 |
| 16 | 18 | 24 |
| 16 | 19 | 32 |
| 16 | 20 | 30 |
| 16 | 21 | 33 |
| 16 | 22 | 38 |
| 16 | 23 | 35 |
| 16 | 24 | 43 |
| 16 | 25 | 39 |
| 16 | 26 | 38 |



| Origin | Destination | Cost |
|--------|-------------|------|
| 17     | 1           | 29   |
| 17     | 2           | 10   |
| 17     | 3           | 24   |
| 17     | 4           | 29   |
| 17     | 5           | 50   |
| 17     | 6           | 41   |
| 17     | 7           | 42   |
| 17     | 8           | 31   |
| 17     | 9           | 37   |
| 17     | 10          | 37   |
| 17     | 11          | 27   |
| 17     | 12          | 35   |
| 17     | 13          | 42   |
| 17     | 14          | 34   |





|    |    |    |
|----|----|----|
| 17 | 15 | 23 |
| 17 | 16 | 27 |
| 17 | 17 | 22 |
| 17 | 18 | 32 |
| 17 | 19 | 25 |
| 17 | 20 | 50 |
| 17 | 21 | 48 |
| 17 | 22 | 52 |
| 17 | 23 | 42 |
| 17 | 24 | 42 |
| 17 | 25 | 90 |
| 17 | 26 | 60 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 18     | 1           | 39   |



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|    |    |    |
|----|----|----|
| 18 | 2  | 65 |
| 18 | 3  | 32 |
| 18 | 4  | 41 |
| 18 | 5  | 42 |
| 18 | 6  | 51 |
| 18 | 7  | 28 |
| 18 | 8  | 35 |
| 18 | 9  | 30 |
| 18 | 10 | 26 |
| 18 | 11 | 27 |
| 18 | 12 | 27 |
| 18 | 13 | 32 |
| 18 | 14 | 30 |
| 18 | 15 | 27 |
| 18 | 16 | 23 |



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|    |    |    |
|----|----|----|
| 18 | 17 | 33 |
| 18 | 18 | 17 |
| 18 | 19 | 32 |
| 18 | 20 | 26 |
| 18 | 21 | 36 |
| 18 | 22 | 45 |
| 18 | 23 | 29 |
| 18 | 24 | 34 |
| 18 | 25 | 39 |
| 18 | 26 | 40 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 19     | 1           | 41   |
| 19     | 2           | 39   |
| 19     | 3           | 36   |



|    |    |    |
|----|----|----|
| 19 | 4  | 43 |
| 19 | 5  | 38 |
| 19 | 6  | 36 |
| 19 | 7  | 33 |
| 19 | 8  | 52 |
| 19 | 9  | 41 |
| 19 | 10 | 40 |
| 19 | 11 | 29 |
| 19 | 12 | 27 |
| 19 | 13 | 35 |
| 19 | 14 | 19 |
| 19 | 15 | 26 |
| 19 | 16 | 29 |
| 19 | 17 | 58 |
| 19 | 18 | 30 |



|    |    |    |
|----|----|----|
| 19 | 19 | 20 |
| 19 | 20 | 32 |
| 19 | 21 | 28 |
| 19 | 22 | 33 |
| 19 | 23 | 31 |
| 19 | 24 | 36 |
| 19 | 25 | 33 |
| 19 | 26 | 29 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 20     | 1           | 50   |
| 20     | 2           | 57   |
| 20     | 3           | 42   |
| 20     | 4           | 36   |
| 20     | 5           | 54   |



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|    |    |    |
|----|----|----|
| 20 | 6  | 30 |
| 20 | 7  | 30 |
| 20 | 8  | 48 |
| 20 | 9  | 41 |
| 20 | 10 | 35 |
| 20 | 11 | 28 |
| 20 | 12 | 25 |
| 20 | 13 | 25 |
| 20 | 14 | 19 |
| 20 | 15 | 25 |
| 20 | 16 | 33 |
| 20 | 17 | 75 |
| 20 | 18 | 29 |
| 20 | 19 | 29 |
| 20 | 20 | 25 |



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|    |    |    |
|----|----|----|
| 20 | 21 | 25 |
| 20 | 22 | 29 |
| 20 | 23 | 21 |
| 20 | 24 | 29 |
| 20 | 25 | 35 |
| 20 | 26 | 30 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 21     | 1           | 41   |
| 21     | 2           | 47   |
| 21     | 3           | 48   |
| 21     | 4           | 43   |
| 21     | 5           | 46   |
| 21     | 6           | 27   |
| 21     | 7           | 32   |



|    |    |    |
|----|----|----|
| 21 | 8  | 43 |
| 21 | 9  | 44 |
| 21 | 10 | 38 |
| 21 | 11 | 30 |
| 21 | 12 | 24 |
| 21 | 13 | 20 |
| 21 | 14 | 23 |
| 21 | 15 | 29 |
| 21 | 16 | 33 |
| 21 | 17 | 50 |
| 21 | 18 | 36 |
| 21 | 19 | 30 |
| 21 | 20 | 24 |
| 21 | 21 | 21 |
| 21 | 22 | 22 |





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|    |    |    |
|----|----|----|
| 21 | 23 | 26 |
| 21 | 24 | 44 |
| 21 | 25 | 41 |
| 21 | 26 | 27 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 22     | 1           | 36   |
| 22     | 2           | 45   |
| 22     | 3           | 44   |
| 22     | 4           | 36   |
| 22     | 5           | 45   |
| 22     | 6           | 30   |
| 22     | 7           | 36   |
| 22     | 8           | 41   |
| 22     | 9           | 51   |



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|    |    |    |
|----|----|----|
| 22 | 10 | 68 |
| 22 | 11 | 40 |
| 22 | 12 | 29 |
| 22 | 13 | 23 |
| 22 | 14 | 31 |
| 22 | 15 | 33 |
| 22 | 16 | 37 |
| 22 | 17 | 53 |
| 22 | 18 | 54 |
| 22 | 19 | 33 |
| 22 | 20 | 28 |
| 22 | 21 | 21 |
| 22 | 22 | 16 |
| 22 | 23 | 25 |
| 22 | 24 | 30 |



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|    |    |    |
|----|----|----|
| 22 | 25 | 30 |
| 22 | 26 | 29 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 23     | 1           | 41   |
| 23     | 2           | 55   |
| 23     | 3           | 41   |
| 23     | 4           | 45   |
| 23     | 5           | 53   |
| 23     | 6           | 30   |
| 23     | 7           | 31   |
| 23     | 8           | 48   |
| 23     | 9           | 54   |
| 23     | 10          | 39   |
| 23     | 11          | 31   |



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|    |    |    |
|----|----|----|
| 23 | 12 | 27 |
| 23 | 13 | 29 |
| 23 | 14 | 21 |
| 23 | 15 | 26 |
| 23 | 16 | 34 |
| 23 | 17 | 36 |
| 23 | 18 | 38 |
| 23 | 19 | 28 |
| 23 | 20 | 20 |
| 23 | 21 | 25 |
| 23 | 22 | 26 |
| 23 | 23 | 18 |
| 23 | 24 | 20 |
| 23 | 25 | 25 |
| 23 | 26 | 23 |



| Origin | Destination | Cost |
|--------|-------------|------|
| 24     | 1           | 47   |
| 24     | 2           | 60   |
| 24     | 3           | 52   |
| 24     | 4           | 36   |
| 24     | 5           | 75   |
| 24     | 6           | 42   |
| 24     | 7           | 35   |
| 24     | 8           | 53   |
| 24     | 9           | 31   |
| 24     | 10          | 48   |
| 24     | 11          | 34   |
| 24     | 12          | 33   |
| 24     | 13          | 41   |
| 24     | 14          | 30   |



|    |    |    |
|----|----|----|
| 24 | 15 | 30 |
| 24 | 16 | 43 |
| 24 | 17 | 57 |
| 24 | 18 | 33 |
| 24 | 19 | 35 |
| 24 | 20 | 26 |
| 24 | 21 | 44 |
| 24 | 22 | 30 |
| 24 | 23 | 29 |
| 24 | 24 | 20 |
| 24 | 25 | 27 |
| 24 | 26 | 36 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 25     | 1           | 41   |



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|    |    |    |
|----|----|----|
| 25 | 2  | 80 |
| 25 | 3  | 48 |
| 25 | 4  | 56 |
| 25 | 5  | 50 |
| 25 | 6  | 45 |
| 25 | 7  | 35 |
| 25 | 8  | 46 |
| 25 | 9  | 51 |
| 25 | 10 | 40 |
| 25 | 11 | 33 |
| 25 | 12 | 35 |
| 25 | 13 | 36 |
| 25 | 14 | 30 |
| 25 | 15 | 31 |
| 25 | 16 | 38 |



|    |    |    |
|----|----|----|
| 25 | 17 | 52 |
| 25 | 18 | 37 |
| 25 | 19 | 31 |
| 25 | 20 | 29 |
| 25 | 21 | 40 |
| 25 | 22 | 28 |
| 25 | 23 | 28 |
| 25 | 24 | 28 |
| 25 | 25 | 23 |
| 25 | 26 | 22 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 26     | 1           | 70   |
| 26     | 2           | 65   |
| 26     | 3           | 50   |





|    |    |    |
|----|----|----|
| 26 | 4  | 55 |
| 26 | 5  | 58 |
| 26 | 6  | 33 |
| 26 | 7  | 39 |
| 26 | 8  | 53 |
| 26 | 9  | 50 |
| 26 | 10 | 39 |
| 26 | 11 | 35 |
| 26 | 12 | 31 |
| 26 | 13 | 33 |
| 26 | 14 | 27 |
| 26 | 15 | 39 |
| 26 | 16 | 39 |
| 26 | 17 | 60 |
| 26 | 18 | 37 |



|    |    |    |
|----|----|----|
| 26 | 19 | 27 |
| 26 | 20 | 29 |
| 26 | 21 | 30 |
| 26 | 22 | 24 |
| 26 | 23 | 25 |
| 26 | 24 | 40 |
| 26 | 25 | 25 |
| 26 | 26 | 21 |

| Given Base Year Trip Matrix |             |              |
|-----------------------------|-------------|--------------|
| Origin                      | Destination | No. of Trips |



|   |    |      |
|---|----|------|
| 1 | 1  | 3413 |
| 1 | 2  | 126  |
| 1 | 3  | 231  |
| 1 | 4  | 384  |
| 1 | 5  | 91   |
| 1 | 6  | 231  |
| 1 | 7  | 301  |
| 1 | 8  | 0    |
| 1 | 9  | 0    |
| 1 | 10 | 45   |
| 1 | 11 | 114  |
| 1 | 12 | 45   |
| 1 | 13 | 174  |
| 1 | 14 | 23   |
| 1 | 15 | 57   |



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|   |    |    |
|---|----|----|
| 1 | 16 | 92 |
| 1 | 17 | 0  |
| 1 | 18 | 0  |
| 1 | 19 | 22 |
| 1 | 20 | 0  |
| 1 | 21 | 69 |
| 1 | 22 | 10 |
| 1 | 23 | 10 |
| 1 | 24 | 11 |
| 1 | 25 | 0  |
| 1 | 26 | 79 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 2      | 1           | 151          |
| 2      | 2           | 564          |



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|   |    |      |
|---|----|------|
| 2 | 3  | 729  |
| 2 | 4  | 507  |
| 2 | 5  | 188  |
| 2 | 6  | 586  |
| 2 | 7  | 1293 |
| 2 | 8  | 71   |
| 2 | 9  | 258  |
| 2 | 10 | 71   |
| 2 | 11 | 620  |
| 2 | 12 | 565  |
| 2 | 13 | 1263 |
| 2 | 14 | 118  |
| 2 | 15 | 163  |
| 2 | 16 | 188  |
| 2 | 17 | 0    |



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|   |    |     |
|---|----|-----|
| 2 | 18 | 23  |
| 2 | 19 | 47  |
| 2 | 20 | 0   |
| 2 | 21 | 318 |
| 2 | 22 | 22  |
| 2 | 23 | 224 |
| 2 | 24 | 0   |
| 2 | 25 | 0   |
| 2 | 26 | 143 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 3      | 1           | 435          |
| 3      | 2           | 289          |
| 3      | 3           | 1806         |
| 3      | 4           | 1207         |



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|   |    |      |
|---|----|------|
| 3 | 5  | 579  |
| 3 | 6  | 3639 |
| 3 | 7  | 2733 |
| 3 | 8  | 342  |
| 3 | 9  | 532  |
| 3 | 10 | 377  |
| 3 | 11 | 1168 |
| 3 | 12 | 1142 |
| 3 | 13 | 3200 |
| 3 | 14 | 297  |
| 3 | 15 | 1115 |
| 3 | 16 | 480  |
| 3 | 17 | 81   |
| 3 | 18 | 114  |
| 3 | 19 | 204  |



---

|   |    |     |
|---|----|-----|
| 3 | 20 | 102 |
| 3 | 21 | 986 |
| 3 | 22 | 0   |
| 3 | 23 | 204 |
| 3 | 24 | 0   |
| 3 | 25 | 266 |
| 3 | 26 | 528 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 4      | 1           | 29           |
| 4      | 2           | 105          |
| 4      | 3           | 507          |
| 4      | 4           | 1030         |
| 4      | 5           | 188          |
| 4      | 6           | 1063         |





---

|   |    |      |
|---|----|------|
| 4 | 7  | 922  |
| 4 | 8  | 58   |
| 4 | 9  | 69   |
| 4 | 10 | 70   |
| 4 | 11 | 402  |
| 4 | 12 | 726  |
| 4 | 13 | 1886 |
| 4 | 14 | 324  |
| 4 | 15 | 437  |
| 4 | 16 | 176  |
| 4 | 17 | 0    |
| 4 | 18 | 23   |
| 4 | 19 | 284  |
| 4 | 20 | 131  |
| 4 | 21 | 527  |



---

|   |    |     |
|---|----|-----|
| 4 | 22 | 23  |
| 4 | 23 | 139 |
| 4 | 24 | 94  |
| 4 | 25 | 23  |
| 4 | 26 | 103 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 5      | 1           | 106          |
| 5      | 2           | 170          |
| 5      | 3           | 370          |
| 5      | 4           | 984          |
| 5      | 5           | 2001         |
| 5      | 6           | 1784         |
| 5      | 7           | 1737         |
| 5      | 8           | 251          |



|   |    |      |
|---|----|------|
| 5 | 9  | 196  |
| 5 | 10 | 173  |
| 5 | 11 | 237  |
| 5 | 12 | 565  |
| 5 | 13 | 1561 |
| 5 | 14 | 303  |
| 5 | 15 | 374  |
| 5 | 16 | 210  |
| 5 | 17 | 15   |
| 5 | 18 | 86   |
| 5 | 19 | 51   |
| 5 | 20 | 89   |
| 5 | 21 | 513  |
| 5 | 22 | 2    |
| 5 | 23 | 203  |



---

|   |    |     |
|---|----|-----|
| 5 | 24 | 0   |
| 5 | 25 | 112 |
| 5 | 26 | 60  |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 6      | 1           | 50           |
| 6      | 2           | 0            |
| 6      | 3           | 48           |
| 6      | 4           | 257          |
| 6      | 5           | 48           |
| 6      | 6           | 1940         |
| 6      | 7           | 454          |
| 6      | 8           | 144          |
| 6      | 9           | 118          |
| 6      | 10          | 25           |



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|   |    |      |
|---|----|------|
| 6 | 11 | 319  |
| 6 | 12 | 998  |
| 6 | 13 | 3683 |
| 6 | 14 | 290  |
| 6 | 15 | 702  |
| 6 | 16 | 187  |
| 6 | 17 | 0    |
| 6 | 18 | 48   |
| 6 | 19 | 370  |
| 6 | 20 | 150  |
| 6 | 21 | 1594 |
| 6 | 22 | 267  |
| 6 | 23 | 194  |
| 6 | 24 | 25   |
| 6 | 25 | 25   |



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|   |    |     |
|---|----|-----|
| 6 | 26 | 250 |
|---|----|-----|

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 7      | 1           | 147          |
| 7      | 2           | 46           |
| 7      | 3           | 420          |
| 7      | 4           | 237          |
| 7      | 5           | 302          |
| 7      | 6           | 1727         |
| 7      | 7           | 969          |
| 7      | 8           | 242          |
| 7      | 9           | 121          |
| 7      | 10          | 364          |
| 7      | 11          | 1182         |
| 7      | 12          | 1294         |



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|   |    |      |
|---|----|------|
| 7 | 13 | 1903 |
| 7 | 14 | 750  |
| 7 | 15 | 889  |
| 7 | 16 | 185  |
| 7 | 17 | 0    |
| 7 | 18 | 83   |
| 7 | 19 | 369  |
| 7 | 20 | 193  |
| 7 | 21 | 1499 |
| 7 | 22 | 135  |
| 7 | 23 | 282  |
| 7 | 24 | 24   |
| 7 | 25 | 49   |
| 7 | 26 | 229  |



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| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 8      | 1           | 102          |
| 8      | 2           | 136          |
| 8      | 3           | 715          |
| 8      | 4           | 341          |
| 8      | 5           | 204          |
| 8      | 6           | 2577         |
| 8      | 7           | 1795         |
| 8      | 8           | 774          |
| 8      | 9           | 331          |
| 8      | 10          | 340          |
| 8      | 11          | 680          |
| 8      | 12          | 895          |
| 8      | 13          | 2334         |
| 8      | 14          | 272          |





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|   |    |      |
|---|----|------|
| 8 | 15 | 1013 |
| 8 | 16 | 613  |
| 8 | 17 | 0    |
| 8 | 18 | 34   |
| 8 | 19 | 238  |
| 8 | 20 | 238  |
| 8 | 21 | 1232 |
| 8 | 22 | 136  |
| 8 | 23 | 191  |
| 8 | 24 | 102  |
| 8 | 25 | 170  |
| 8 | 26 | 340  |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 9      | 1           | 0            |



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|   |    |      |
|---|----|------|
| 9 | 2  | 142  |
| 9 | 3  | 574  |
| 9 | 4  | 234  |
| 9 | 5  | 116  |
| 9 | 6  | 2001 |
| 9 | 7  | 2037 |
| 9 | 8  | 189  |
| 9 | 9  | 382  |
| 9 | 10 | 1073 |
| 9 | 11 | 1558 |
| 9 | 12 | 899  |
| 9 | 13 | 2396 |
| 9 | 14 | 678  |
| 9 | 15 | 997  |
| 9 | 16 | 835  |



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|   |    |      |
|---|----|------|
| 9 | 17 | 68   |
| 9 | 18 | 400  |
| 9 | 19 | 427  |
| 9 | 20 | 173  |
| 9 | 21 | 1194 |
| 9 | 22 | 159  |
| 9 | 23 | 213  |
| 9 | 24 | 71   |
| 9 | 25 | 213  |
| 9 | 26 | 607  |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 10     | 1           | 121          |
| 10     | 2           | 0            |
| 10     | 3           | 333          |



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|    |    |      |
|----|----|------|
| 10 | 4  | 89   |
| 10 | 5  | 162  |
| 10 | 6  | 1311 |
| 10 | 7  | 1624 |
| 10 | 8  | 116  |
| 10 | 9  | 293  |
| 10 | 10 | 1034 |
| 10 | 11 | 926  |
| 10 | 12 | 928  |
| 10 | 13 | 2741 |
| 10 | 14 | 498  |
| 10 | 15 | 1244 |
| 10 | 16 | 1377 |
| 10 | 17 | 58   |
| 10 | 18 | 118  |



---

|    |    |     |
|----|----|-----|
| 10 | 19 | 84  |
| 10 | 20 | 325 |
| 10 | 21 | 939 |
| 10 | 22 | 89  |
| 10 | 23 | 118 |
| 10 | 24 | 63  |
| 10 | 25 | 294 |
| 10 | 26 | 469 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 11     | 1           | 64           |
| 11     | 2           | 161          |
| 11     | 3           | 472          |
| 11     | 4           | 115          |
| 11     | 5           | 107          |



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|    |    |      |
|----|----|------|
| 11 | 6  | 1676 |
| 11 | 7  | 787  |
| 11 | 8  | 248  |
| 11 | 9  | 151  |
| 11 | 10 | 160  |
| 11 | 11 | 2521 |
| 11 | 12 | 1091 |
| 11 | 13 | 4171 |
| 11 | 14 | 788  |
| 11 | 15 | 774  |
| 11 | 16 | 868  |
| 11 | 17 | 25   |
| 11 | 18 | 96   |
| 11 | 19 | 403  |
| 11 | 20 | 302  |



|    |    |     |
|----|----|-----|
| 11 | 21 | 870 |
| 11 | 22 | 66  |
| 11 | 23 | 352 |
| 11 | 24 | 143 |
| 11 | 25 | 288 |
| 11 | 26 | 531 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 12     | 1           | 0            |
| 12     | 2           | 54           |
| 12     | 3           | 9            |
| 12     | 4           | 0            |
| 12     | 5           | 0            |
| 12     | 6           | 833          |
| 12     | 7           | 314          |



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|    |    |      |
|----|----|------|
| 12 | 8  | 19   |
| 12 | 9  | 10   |
| 12 | 10 | 25   |
| 12 | 11 | 191  |
| 12 | 12 | 612  |
| 12 | 13 | 1725 |
| 12 | 14 | 439  |
| 12 | 15 | 200  |
| 12 | 16 | 71   |
| 12 | 17 | 0    |
| 12 | 18 | 15   |
| 12 | 19 | 173  |
| 12 | 20 | 184  |
| 12 | 21 | 623  |
| 12 | 22 | 25   |





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---

|    |    |     |
|----|----|-----|
| 12 | 23 | 55  |
| 12 | 24 | 9   |
| 12 | 25 | 62  |
| 12 | 26 | 181 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 13     | 1           | 0            |
| 13     | 2           | 73           |
| 13     | 3           | 35           |
| 13     | 4           | 49           |
| 13     | 5           | 0            |
| 13     | 6           | 784          |
| 13     | 7           | 215          |
| 13     | 8           | 107          |
| 13     | 9           | 78           |



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|    |    |      |
|----|----|------|
| 13 | 10 | 185  |
| 13 | 11 | 111  |
| 13 | 12 | 856  |
| 13 | 13 | 1224 |
| 13 | 14 | 284  |
| 13 | 15 | 281  |
| 13 | 16 | 108  |
| 13 | 17 | 15   |
| 13 | 18 | 0    |
| 13 | 19 | 47   |
| 13 | 20 | 101  |
| 13 | 21 | 482  |
| 13 | 22 | 33   |
| 13 | 23 | 89   |
| 13 | 24 | 0    |



---

|    |    |     |
|----|----|-----|
| 13 | 25 | 68  |
| 13 | 26 | 134 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 14     | 1           | 16           |
| 14     | 2           | 0            |
| 14     | 3           | 52           |
| 14     | 4           | 36           |
| 14     | 5           | 88           |
| 14     | 6           | 638          |
| 14     | 7           | 264          |
| 14     | 8           | 77           |
| 14     | 9           | 23           |
| 14     | 10          | 100          |
| 14     | 11          | 374          |



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|    |    |      |
|----|----|------|
| 14 | 12 | 408  |
| 14 | 13 | 1538 |
| 14 | 14 | 593  |
| 14 | 15 | 385  |
| 14 | 16 | 90   |
| 14 | 17 | 44   |
| 14 | 18 | 0    |
| 14 | 19 | 360  |
| 14 | 20 | 146  |
| 14 | 21 | 471  |
| 14 | 22 | 59   |
| 14 | 23 | 151  |
| 14 | 24 | 37   |
| 14 | 25 | 81   |
| 14 | 26 | 190  |



| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 15     | 1           | 49           |
| 15     | 2           | 0            |
| 15     | 3           | 120          |
| 15     | 4           | 24           |
| 15     | 5           | 24           |
| 15     | 6           | 813          |
| 15     | 7           | 458          |
| 15     | 8           | 142          |
| 15     | 9           | 86           |
| 15     | 10          | 58           |
| 15     | 11          | 802          |
| 15     | 12          | 656          |
| 15     | 13          | 2228         |
| 15     | 14          | 1041         |



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|    |    |      |
|----|----|------|
| 15 | 15 | 1144 |
| 15 | 16 | 344  |
| 15 | 17 | 0    |
| 15 | 18 | 206  |
| 15 | 19 | 328  |
| 15 | 20 | 262  |
| 15 | 21 | 436  |
| 15 | 22 | 55   |
| 15 | 23 | 175  |
| 15 | 24 | 72   |
| 15 | 25 | 174  |
| 15 | 26 | 285  |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 16     | 1           | 50           |



|    |    |      |
|----|----|------|
| 16 | 2  | 50   |
| 16 | 3  | 173  |
| 16 | 4  | 176  |
| 16 | 5  | 50   |
| 16 | 6  | 815  |
| 16 | 7  | 596  |
| 16 | 8  | 93   |
| 16 | 9  | 76   |
| 16 | 10 | 499  |
| 16 | 11 | 980  |
| 16 | 12 | 714  |
| 16 | 13 | 1206 |
| 16 | 14 | 236  |
| 16 | 15 | 690  |
| 16 | 16 | 964  |



|    |    |     |
|----|----|-----|
| 16 | 17 | 77  |
| 16 | 18 | 114 |
| 16 | 19 | 159 |
| 16 | 20 | 164 |
| 16 | 21 | 603 |
| 16 | 22 | 110 |
| 16 | 23 | 50  |
| 16 | 24 | 151 |
| 16 | 25 | 91  |
| 16 | 26 | 255 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 17     | 1           | 61           |
| 17     | 2           | 15           |
| 17     | 3           | 677          |





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|    |    |     |
|----|----|-----|
| 17 | 4  | 86  |
| 17 | 5  | 46  |
| 17 | 6  | 207 |
| 17 | 7  | 208 |
| 17 | 8  | 50  |
| 17 | 9  | 77  |
| 17 | 10 | 180 |
| 17 | 11 | 344 |
| 17 | 12 | 93  |
| 17 | 13 | 239 |
| 17 | 14 | 86  |
| 17 | 15 | 177 |
| 17 | 16 | 438 |
| 17 | 17 | 80  |
| 17 | 18 | 30  |



---

|    |    |     |
|----|----|-----|
| 17 | 19 | 24  |
| 17 | 20 | 0   |
| 17 | 21 | 303 |
| 17 | 22 | 9   |
| 17 | 23 | 78  |
| 17 | 24 | 18  |
| 17 | 25 | 0   |
| 17 | 26 | 43  |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 18     | 1           | 0            |
| 18     | 2           | 19           |
| 18     | 3           | 25           |
| 18     | 4           | 15           |
| 18     | 5           | 45           |



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|    |    |     |
|----|----|-----|
| 18 | 6  | 186 |
| 18 | 7  | 224 |
| 18 | 8  | 0   |
| 18 | 9  | 58  |
| 18 | 10 | 135 |
| 18 | 11 | 196 |
| 18 | 12 | 323 |
| 18 | 13 | 845 |
| 18 | 14 | 432 |
| 18 | 15 | 646 |
| 18 | 16 | 562 |
| 18 | 17 | 38  |
| 18 | 18 | 330 |
| 18 | 19 | 213 |
| 18 | 20 | 97  |



---

|    |    |     |
|----|----|-----|
| 18 | 21 | 351 |
| 18 | 22 | 19  |
| 18 | 23 | 106 |
| 18 | 24 | 38  |
| 18 | 25 | 71  |
| 18 | 26 | 219 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 19     | 1           | 49           |
| 19     | 2           | 33           |
| 19     | 3           | 101          |
| 19     | 4           | 16           |
| 19     | 5           | 17           |
| 19     | 6           | 437          |
| 19     | 7           | 296          |



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|    |    |      |
|----|----|------|
| 19 | 8  | 17   |
| 19 | 9  | 81   |
| 19 | 10 | 108  |
| 19 | 11 | 201  |
| 19 | 12 | 350  |
| 19 | 13 | 1300 |
| 19 | 14 | 498  |
| 19 | 15 | 792  |
| 19 | 16 | 227  |
| 19 | 17 | 34   |
| 19 | 18 | 183  |
| 19 | 19 | 521  |
| 19 | 20 | 283  |
| 19 | 21 | 177  |
| 19 | 22 | 34   |



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|    |    |     |
|----|----|-----|
| 19 | 23 | 135 |
| 19 | 24 | 62  |
| 19 | 25 | 124 |
| 19 | 26 | 98  |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 20     | 1           | 0            |
| 20     | 2           | 0            |
| 20     | 3           | 93           |
| 20     | 4           | 67           |
| 20     | 5           | 57           |
| 20     | 6           | 1494         |
| 20     | 7           | 523          |
| 20     | 8           | 0            |
| 20     | 9           | 0            |



|    |    |      |
|----|----|------|
| 20 | 10 | 247  |
| 20 | 11 | 531  |
| 20 | 12 | 980  |
| 20 | 13 | 2327 |
| 20 | 14 | 854  |
| 20 | 15 | 596  |
| 20 | 16 | 395  |
| 20 | 17 | 0    |
| 20 | 18 | 64   |
| 20 | 19 | 391  |
| 20 | 20 | 400  |
| 20 | 21 | 550  |
| 20 | 22 | 67   |
| 20 | 23 | 194  |
| 20 | 24 | 44   |



---

|    |    |     |
|----|----|-----|
| 20 | 25 | 0   |
| 20 | 26 | 531 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 21     | 1           | 121          |
| 21     | 2           | 0            |
| 21     | 3           | 25           |
| 21     | 4           | 48           |
| 21     | 5           | 23           |
| 21     | 6           | 1304         |
| 21     | 7           | 514          |
| 21     | 8           | 117          |
| 21     | 9           | 47           |
| 21     | 10          | 121          |
| 21     | 11          | 377          |





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|    |    |      |
|----|----|------|
| 21 | 12 | 1421 |
| 21 | 13 | 4354 |
| 21 | 14 | 424  |
| 21 | 15 | 365  |
| 21 | 16 | 221  |
| 21 | 17 | 9    |
| 21 | 18 | 60   |
| 21 | 19 | 113  |
| 21 | 20 | 104  |
| 21 | 21 | 1228 |
| 21 | 22 | 611  |
| 21 | 23 | 220  |
| 21 | 24 | 16   |
| 21 | 25 | 108  |
| 21 | 26 | 258  |



| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 22     | 1           | 107          |
| 22     | 2           | 0            |
| 22     | 3           | 24           |
| 22     | 4           | 21           |
| 22     | 5           | 0            |
| 22     | 6           | 886          |
| 22     | 7           | 158          |
| 22     | 8           | 133          |
| 22     | 9           | 24           |
| 22     | 10          | 21           |
| 22     | 11          | 491          |
| 22     | 12          | 425          |
| 22     | 13          | 1653         |
| 22     | 14          | 346          |



|    |    |      |
|----|----|------|
| 22 | 15 | 273  |
| 22 | 16 | 173  |
| 22 | 17 | 46   |
| 22 | 18 | 23   |
| 22 | 19 | 159  |
| 22 | 20 | 140  |
| 22 | 21 | 1256 |
| 22 | 22 | 896  |
| 22 | 23 | 225  |
| 22 | 24 | 0    |
| 22 | 25 | 117  |
| 22 | 26 | 479  |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 23     | 1           | 134          |



|    |    |      |
|----|----|------|
| 23 | 2  | 18   |
| 23 | 3  | 111  |
| 23 | 4  | 120  |
| 23 | 5  | 26   |
| 23 | 6  | 479  |
| 23 | 7  | 202  |
| 23 | 8  | 18   |
| 23 | 9  | 61   |
| 23 | 10 | 37   |
| 23 | 11 | 358  |
| 23 | 12 | 673  |
| 23 | 13 | 1744 |
| 23 | 14 | 335  |
| 23 | 15 | 226  |
| 23 | 16 | 80   |



|    |    |     |
|----|----|-----|
| 23 | 17 | 0   |
| 23 | 18 | 0   |
| 23 | 19 | 155 |
| 23 | 20 | 166 |
| 23 | 21 | 640 |
| 23 | 22 | 105 |
| 23 | 23 | 259 |
| 23 | 24 | 31  |
| 23 | 25 | 192 |
| 23 | 26 | 354 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 24     | 1           | 0            |
| 24     | 2           | 0            |
| 24     | 3           | 0            |



|    |    |     |
|----|----|-----|
| 24 | 4  | 0   |
| 24 | 5  | 0   |
| 24 | 6  | 161 |
| 24 | 7  | 186 |
| 24 | 8  | 67  |
| 24 | 9  | 22  |
| 24 | 10 | 78  |
| 24 | 11 | 344 |
| 24 | 12 | 49  |
| 24 | 13 | 258 |
| 24 | 14 | 285 |
| 24 | 15 | 229 |
| 24 | 16 | 168 |
| 24 | 17 | 0   |
| 24 | 18 | 97  |



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|    |    |     |
|----|----|-----|
| 24 | 19 | 359 |
| 24 | 20 | 81  |
| 24 | 21 | 238 |
| 24 | 22 | 118 |
| 24 | 23 | 31  |
| 24 | 24 | 681 |
| 24 | 25 | 351 |
| 24 | 26 | 254 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 25     | 1           | 345          |
| 25     | 2           | 65           |
| 25     | 3           | 131          |
| 25     | 4           | 107          |
| 25     | 5           | 98           |



|    |    |      |
|----|----|------|
| 25 | 6  | 389  |
| 25 | 7  | 1869 |
| 25 | 8  | 32   |
| 25 | 9  | 65   |
| 25 | 10 | 368  |
| 25 | 11 | 986  |
| 25 | 12 | 772  |
| 25 | 13 | 1754 |
| 25 | 14 | 921  |
| 25 | 15 | 866  |
| 25 | 16 | 516  |
| 25 | 17 | 0    |
| 25 | 18 | 417  |
| 25 | 19 | 976  |
| 25 | 20 | 378  |





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|    |    |      |
|----|----|------|
| 25 | 21 | 1000 |
| 25 | 22 | 468  |
| 25 | 23 | 639  |
| 25 | 24 | 616  |
| 25 | 25 | 2242 |
| 25 | 26 | 1245 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 26     | 1           | 32           |
| 26     | 2           | 0            |
| 26     | 3           | 0            |
| 26     | 4           | 10           |
| 26     | 5           | 32           |
| 26     | 6           | 144          |
| 26     | 7           | 159          |



|    |    |     |
|----|----|-----|
| 26 | 8  | 19  |
| 26 | 9  | 19  |
| 26 | 10 | 54  |
| 26 | 11 | 113 |
| 26 | 12 | 126 |
| 26 | 13 | 702 |
| 26 | 14 | 243 |
| 26 | 15 | 52  |
| 26 | 16 | 54  |
| 26 | 17 | 0   |
| 26 | 18 | 17  |
| 26 | 19 | 95  |
| 26 | 20 | 152 |
| 26 | 21 | 187 |
| 26 | 22 | 184 |



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|    |    |     |
|----|----|-----|
| 26 | 23 | 234 |
| 26 | 24 | 78  |
| 26 | 25 | 222 |
| 26 | 26 | 650 |

| Sum Totals of Origin |        | Sum Totals of Destination |        |
|----------------------|--------|---------------------------|--------|
| Origin               | Totals | Destination               | Totals |
| O1                   | 5528   | D1                        | 5582   |
| O2                   | 8112   | D2                        | 2066   |
| O3                   | 21826  | D3                        | 7781   |
| O4                   | 9339   | D4                        | 6160   |
| O5                   | 12153  | D5                        | 4492   |
| O6                   | 12186  | D6                        | 28105  |



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|     |       |     |       |
|-----|-------|-----|-------|
| O7  | 13641 | D7  | 20838 |
| O8  | 15803 | D8  | 3326  |
| O9  | 17636 | D9  | 3178  |
| O10 | 15354 | D10 | 5948  |
| O11 | 17230 | D11 | 16126 |
| O12 | 5829  | D12 | 17606 |
| O13 | 5359  | D13 | 48409 |
| O14 | 6221  | D14 | 11358 |
| O15 | 9982  | D15 | 14687 |
| O16 | 9142  | D16 | 9622  |
| O17 | 3569  | D17 | 590   |
| O18 | 5193  | D18 | 2581  |
| O19 | 6174  | D19 | 6572  |
| O20 | 10405 | D20 | 4361  |
| O21 | 12209 | D21 | 18286 |



|     |       |     |      |
|-----|-------|-----|------|
| O22 | 8076  | D22 | 3702 |
| O23 | 6524  | D23 | 4771 |
| O24 | 4057  | D24 | 2386 |
| O25 | 17265 | D25 | 5343 |
| O26 | 3578  | D26 | 8515 |

**Selected Frictional Functions : Exponential Function [ $F_{ij} = e^{-BC_{ij}}$ ]**

Solution :

| Trip Matrix with respect to Optimal Beta Value (Minimum SSE) |             |              |
|--------------------------------------------------------------|-------------|--------------|
| Origin                                                       | Destination | No. of Trips |
| 1                                                            | 1           | 118          |
| 1                                                            | 2           | 44           |
| 1                                                            | 3           | 165          |



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|   |    |      |
|---|----|------|
| 1 | 4  | 131  |
| 1 | 5  | 95   |
| 1 | 6  | 593  |
| 1 | 7  | 442  |
| 1 | 8  | 69   |
| 1 | 9  | 68   |
| 1 | 10 | 125  |
| 1 | 11 | 337  |
| 1 | 12 | 373  |
| 1 | 13 | 1016 |
| 1 | 14 | 237  |
| 1 | 15 | 310  |
| 1 | 16 | 203  |
| 1 | 17 | 12   |
| 1 | 18 | 54   |



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|   |    |     |
|---|----|-----|
| 1 | 19 | 133 |
| 1 | 20 | 90  |
| 1 | 21 | 386 |
| 1 | 22 | 77  |
| 1 | 23 | 99  |
| 1 | 24 | 49  |
| 1 | 25 | 111 |
| 1 | 26 | 178 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 2      | 1           | 173          |
| 2      | 2           | 64           |
| 2      | 3           | 242          |
| 2      | 4           | 192          |
| 2      | 5           | 138          |



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|   |    |      |
|---|----|------|
| 2 | 6  | 870  |
| 2 | 7  | 649  |
| 2 | 8  | 102  |
| 2 | 9  | 98   |
| 2 | 10 | 184  |
| 2 | 11 | 499  |
| 2 | 12 | 538  |
| 2 | 13 | 1503 |
| 2 | 14 | 347  |
| 2 | 15 | 455  |
| 2 | 16 | 302  |
| 2 | 17 | 17   |
| 2 | 18 | 79   |
| 2 | 19 | 203  |
| 2 | 20 | 133  |





|   |    |     |
|---|----|-----|
| 2 | 21 | 560 |
| 2 | 22 | 114 |
| 2 | 23 | 145 |
| 2 | 24 | 72  |
| 2 | 25 | 160 |
| 2 | 26 | 261 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 3      | 1           | 465          |
| 3      | 2           | 172          |
| 3      | 3           | 656          |
| 3      | 4           | 517          |
| 3      | 5           | 375          |
| 3      | 6           | 2349         |
| 3      | 7           | 1750         |



|   |    |      |
|---|----|------|
| 3 | 8  | 278  |
| 3 | 9  | 267  |
| 3 | 10 | 497  |
| 3 | 11 | 1346 |
| 3 | 12 | 1466 |
| 3 | 13 | 4002 |
| 3 | 14 | 942  |
| 3 | 15 | 1221 |
| 3 | 16 | 802  |
| 3 | 17 | 49   |
| 3 | 18 | 215  |
| 3 | 19 | 545  |
| 3 | 20 | 360  |
| 3 | 21 | 1505 |
| 3 | 22 | 306  |



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|   |    |     |
|---|----|-----|
| 3 | 23 | 392 |
| 3 | 24 | 197 |
| 3 | 25 | 439 |
| 3 | 26 | 699 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 4      | 1           | 199          |
| 4      | 2           | 74           |
| 4      | 3           | 279          |
| 4      | 4           | 222          |
| 4      | 5           | 161          |
| 4      | 6           | 1005         |
| 4      | 7           | 749          |
| 4      | 8           | 119          |
| 4      | 9           | 113          |



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|   |    |      |
|---|----|------|
| 4 | 10 | 212  |
| 4 | 11 | 576  |
| 4 | 12 | 626  |
| 4 | 13 | 1717 |
| 4 | 14 | 403  |
| 4 | 15 | 523  |
| 4 | 16 | 339  |
| 4 | 17 | 20   |
| 4 | 18 | 91   |
| 4 | 19 | 232  |
| 4 | 20 | 155  |
| 4 | 21 | 648  |
| 4 | 22 | 131  |
| 4 | 23 | 167  |
| 4 | 24 | 82   |



---

|   |    |     |
|---|----|-----|
| 4 | 25 | 184 |
| 4 | 26 | 297 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 5      | 1           | 258          |
| 5      | 2           | 95           |
| 5      | 3           | 361          |
| 5      | 4           | 289          |
| 5      | 5           | 211          |
| 5      | 6           | 1309         |
| 5      | 7           | 974          |
| 5      | 8           | 155          |
| 5      | 9           | 148          |
| 5      | 10          | 275          |
| 5      | 11          | 752          |



|   |    |      |
|---|----|------|
| 5 | 12 | 817  |
| 5 | 13 | 2237 |
| 5 | 14 | 526  |
| 5 | 15 | 684  |
| 5 | 16 | 443  |
| 5 | 17 | 27   |
| 5 | 18 | 117  |
| 5 | 19 | 303  |
| 5 | 20 | 199  |
| 5 | 21 | 831  |
| 5 | 22 | 170  |
| 5 | 23 | 220  |
| 5 | 24 | 109  |
| 5 | 25 | 243  |
| 5 | 26 | 388  |



| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 6      | 1           | 255          |
| 6      | 2           | 95           |
| 6      | 3           | 360          |
| 6      | 4           | 285          |
| 6      | 5           | 207          |
| 6      | 6           | 1314         |
| 6      | 7           | 969          |
| 6      | 8           | 153          |
| 6      | 9           | 146          |
| 6      | 10          | 276          |
| 6      | 11          | 750          |
| 6      | 12          | 822          |
| 6      | 13          | 2257         |
| 6      | 14          | 527          |



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|   |    |     |
|---|----|-----|
| 6 | 15 | 680 |
| 6 | 16 | 447 |
| 6 | 17 | 27  |
| 6 | 18 | 119 |
| 6 | 19 | 303 |
| 6 | 20 | 201 |
| 6 | 21 | 851 |
| 6 | 22 | 170 |
| 6 | 23 | 220 |
| 6 | 24 | 108 |
| 6 | 25 | 242 |
| 6 | 26 | 389 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 7      | 1           | 289          |





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|   |    |      |
|---|----|------|
| 7 | 2  | 106  |
| 7 | 3  | 404  |
| 7 | 4  | 320  |
| 7 | 5  | 233  |
| 7 | 6  | 1468 |
| 7 | 7  | 1092 |
| 7 | 8  | 172  |
| 7 | 9  | 165  |
| 7 | 10 | 310  |
| 7 | 11 | 841  |
| 7 | 12 | 919  |
| 7 | 13 | 2514 |
| 7 | 14 | 591  |
| 7 | 15 | 762  |
| 7 | 16 | 497  |



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|   |    |     |
|---|----|-----|
| 7 | 17 | 30  |
| 7 | 18 | 133 |
| 7 | 19 | 339 |
| 7 | 20 | 225 |
| 7 | 21 | 946 |
| 7 | 22 | 189 |
| 7 | 23 | 247 |
| 7 | 24 | 122 |
| 7 | 25 | 274 |
| 7 | 26 | 438 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 8      | 1           | 334          |
| 8      | 2           | 124          |
| 8      | 3           | 473          |



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|   |    |      |
|---|----|------|
| 8 | 4  | 375  |
| 8 | 5  | 271  |
| 8 | 6  | 1699 |
| 8 | 7  | 1267 |
| 8 | 8  | 202  |
| 8 | 9  | 193  |
| 8 | 10 | 363  |
| 8 | 11 | 978  |
| 8 | 12 | 1059 |
| 8 | 13 | 2906 |
| 8 | 14 | 681  |
| 8 | 15 | 886  |
| 8 | 16 | 584  |
| 8 | 17 | 35   |
| 8 | 18 | 154  |



|   |    |      |
|---|----|------|
| 8 | 19 | 389  |
| 8 | 20 | 258  |
| 8 | 21 | 1094 |
| 8 | 22 | 221  |
| 8 | 23 | 281  |
| 8 | 24 | 141  |
| 8 | 25 | 317  |
| 8 | 26 | 507  |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 9      | 1           | 378          |
| 9      | 2           | 138          |
| 9      | 3           | 528          |
| 9      | 4           | 417          |
| 9      | 5           | 299          |



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|   |    |      |
|---|----|------|
| 9 | 6  | 1895 |
| 9 | 7  | 1412 |
| 9 | 8  | 225  |
| 9 | 9  | 216  |
| 9 | 10 | 404  |
| 9 | 11 | 1092 |
| 9 | 12 | 1183 |
| 9 | 13 | 3235 |
| 9 | 14 | 762  |
| 9 | 15 | 989  |
| 9 | 16 | 651  |
| 9 | 17 | 39   |
| 9 | 18 | 174  |
| 9 | 19 | 438  |
| 9 | 20 | 292  |



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|   |    |      |
|---|----|------|
| 9 | 21 | 1217 |
| 9 | 22 | 244  |
| 9 | 23 | 317  |
| 9 | 24 | 159  |
| 9 | 25 | 354  |
| 9 | 26 | 563  |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 10     | 1           | 323          |
| 10     | 2           | 121          |
| 10     | 3           | 455          |
| 10     | 4           | 361          |
| 10     | 5           | 260          |
| 10     | 6           | 1653         |
| 10     | 7           | 1232         |



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|    |    |      |
|----|----|------|
| 10 | 8  | 195  |
| 10 | 9  | 187  |
| 10 | 10 | 351  |
| 10 | 11 | 950  |
| 10 | 12 | 1036 |
| 10 | 13 | 2823 |
| 10 | 14 | 659  |
| 10 | 15 | 862  |
| 10 | 16 | 566  |
| 10 | 17 | 34   |
| 10 | 18 | 151  |
| 10 | 19 | 382  |
| 10 | 20 | 253  |
| 10 | 21 | 1063 |
| 10 | 22 | 213  |



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|    |    |     |
|----|----|-----|
| 10 | 23 | 276 |
| 10 | 24 | 137 |
| 10 | 25 | 309 |
| 10 | 26 | 489 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 11     | 1           | 358          |
| 11     | 2           | 132          |
| 11     | 3           | 509          |
| 11     | 4           | 402          |
| 11     | 5           | 293          |
| 11     | 6           | 1852         |
| 11     | 7           | 1372         |
| 11     | 8           | 218          |
| 11     | 9           | 208          |





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|    |    |      |
|----|----|------|
| 11 | 10 | 392  |
| 11 | 11 | 1066 |
| 11 | 12 | 1160 |
| 11 | 13 | 3184 |
| 11 | 14 | 747  |
| 11 | 15 | 965  |
| 11 | 16 | 634  |
| 11 | 17 | 38   |
| 11 | 18 | 168  |
| 11 | 19 | 430  |
| 11 | 20 | 285  |
| 11 | 21 | 1197 |
| 11 | 22 | 240  |
| 11 | 23 | 311  |
| 11 | 24 | 155  |



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---

|    |    |     |
|----|----|-----|
| 11 | 25 | 347 |
| 11 | 26 | 555 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 12     | 1           | 122          |
| 12     | 2           | 45           |
| 12     | 3           | 171          |
| 12     | 4           | 135          |
| 12     | 5           | 99           |
| 12     | 6           | 626          |
| 12     | 7           | 462          |
| 12     | 8           | 73           |
| 12     | 9           | 69           |
| 12     | 10          | 131          |
| 12     | 11          | 358          |



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|    |    |      |
|----|----|------|
| 12 | 12 | 394  |
| 12 | 13 | 1081 |
| 12 | 14 | 253  |
| 12 | 15 | 326  |
| 12 | 16 | 212  |
| 12 | 17 | 12   |
| 12 | 18 | 57   |
| 12 | 19 | 145  |
| 12 | 20 | 96   |
| 12 | 21 | 407  |
| 12 | 22 | 82   |
| 12 | 23 | 105  |
| 12 | 24 | 52   |
| 12 | 25 | 117  |
| 12 | 26 | 188  |



| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 13     | 1           | 111          |
| 13     | 2           | 41           |
| 13     | 3           | 156          |
| 13     | 4           | 124          |
| 13     | 5           | 90           |
| 13     | 6           | 576          |
| 13     | 7           | 424          |
| 13     | 8           | 67           |
| 13     | 9           | 64           |
| 13     | 10          | 120          |
| 13     | 11          | 329          |
| 13     | 12          | 361          |
| 13     | 13          | 997          |
| 13     | 14          | 233          |



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|    |    |     |
|----|----|-----|
| 13 | 15 | 299 |
| 13 | 16 | 195 |
| 13 | 17 | 11  |
| 13 | 18 | 52  |
| 13 | 19 | 133 |
| 13 | 20 | 89  |
| 13 | 21 | 375 |
| 13 | 22 | 75  |
| 13 | 23 | 97  |
| 13 | 24 | 48  |
| 13 | 25 | 107 |
| 13 | 26 | 172 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 14     | 1           | 129          |



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|    |    |      |
|----|----|------|
| 14 | 2  | 48   |
| 14 | 3  | 181  |
| 14 | 4  | 144  |
| 14 | 5  | 104  |
| 14 | 6  | 666  |
| 14 | 7  | 493  |
| 14 | 8  | 78   |
| 14 | 9  | 74   |
| 14 | 10 | 140  |
| 14 | 11 | 382  |
| 14 | 12 | 420  |
| 14 | 13 | 1154 |
| 14 | 14 | 271  |
| 14 | 15 | 350  |
| 14 | 16 | 228  |



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|    |    |     |
|----|----|-----|
| 14 | 17 | 13  |
| 14 | 18 | 60  |
| 14 | 19 | 156 |
| 14 | 20 | 103 |
| 14 | 21 | 434 |
| 14 | 22 | 87  |
| 14 | 23 | 113 |
| 14 | 24 | 56  |
| 14 | 25 | 125 |
| 14 | 26 | 200 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 15     | 1           | 208          |
| 15     | 2           | 76           |
| 15     | 3           | 294          |



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|    |    |      |
|----|----|------|
| 15 | 4  | 232  |
| 15 | 5  | 168  |
| 15 | 6  | 1067 |
| 15 | 7  | 792  |
| 15 | 8  | 126  |
| 15 | 9  | 120  |
| 15 | 10 | 226  |
| 15 | 11 | 616  |
| 15 | 12 | 673  |
| 15 | 13 | 1841 |
| 15 | 14 | 435  |
| 15 | 15 | 563  |
| 15 | 16 | 367  |
| 15 | 17 | 22   |
| 15 | 18 | 98   |





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|    |    |     |
|----|----|-----|
| 15 | 19 | 250 |
| 15 | 20 | 166 |
| 15 | 21 | 696 |
| 15 | 22 | 140 |
| 15 | 23 | 182 |
| 15 | 24 | 90  |
| 15 | 25 | 202 |
| 15 | 26 | 320 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 16     | 1           | 193          |
| 16     | 2           | 71           |
| 16     | 3           | 270          |
| 16     | 4           | 212          |
| 16     | 5           | 154          |



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|    |    |      |
|----|----|------|
| 16 | 6  | 981  |
| 16 | 7  | 729  |
| 16 | 8  | 115  |
| 16 | 9  | 110  |
| 16 | 10 | 208  |
| 16 | 11 | 560  |
| 16 | 12 | 612  |
| 16 | 13 | 1690 |
| 16 | 14 | 396  |
| 16 | 15 | 514  |
| 16 | 16 | 336  |
| 16 | 17 | 20   |
| 16 | 18 | 90   |
| 16 | 19 | 228  |
| 16 | 20 | 151  |



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|    |    |     |
|----|----|-----|
| 16 | 21 | 635 |
| 16 | 22 | 127 |
| 16 | 23 | 165 |
| 16 | 24 | 82  |
| 16 | 25 | 184 |
| 16 | 26 | 294 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 17     | 1           | 76           |
| 17     | 2           | 28           |
| 17     | 3           | 107          |
| 17     | 4           | 84           |
| 17     | 5           | 60           |
| 17     | 6           | 381          |
| 17     | 7           | 282          |



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|    |    |     |
|----|----|-----|
| 17 | 8  | 45  |
| 17 | 9  | 43  |
| 17 | 10 | 81  |
| 17 | 11 | 221 |
| 17 | 12 | 240 |
| 17 | 13 | 656 |
| 17 | 14 | 155 |
| 17 | 15 | 202 |
| 17 | 16 | 132 |
| 17 | 17 | 8   |
| 17 | 18 | 35  |
| 17 | 19 | 90  |
| 17 | 20 | 58  |
| 17 | 21 | 246 |
| 17 | 22 | 49  |



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|    |    |     |
|----|----|-----|
| 17 | 23 | 64  |
| 17 | 24 | 32  |
| 17 | 25 | 69  |
| 17 | 26 | 113 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 18     | 1           | 109          |
| 18     | 2           | 39           |
| 18     | 3           | 154          |
| 18     | 4           | 121          |
| 18     | 5           | 88           |
| 18     | 6           | 546          |
| 18     | 7           | 414          |
| 18     | 8           | 65           |
| 18     | 9           | 63           |



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|    |    |     |
|----|----|-----|
| 18 | 10 | 118 |
| 18 | 11 | 321 |
| 18 | 12 | 350 |
| 18 | 13 | 959 |
| 18 | 14 | 225 |
| 18 | 15 | 292 |
| 18 | 16 | 192 |
| 18 | 17 | 11  |
| 18 | 18 | 51  |
| 18 | 19 | 130 |
| 18 | 20 | 86  |
| 18 | 21 | 361 |
| 18 | 22 | 72  |
| 18 | 23 | 94  |
| 18 | 24 | 47  |



---

|    |    |     |
|----|----|-----|
| 18 | 25 | 105 |
| 18 | 26 | 167 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 19     | 1           | 130          |
| 19     | 2           | 48           |
| 19     | 3           | 182          |
| 19     | 4           | 143          |
| 19     | 5           | 105          |
| 19     | 6           | 658          |
| 19     | 7           | 489          |
| 19     | 8           | 76           |
| 19     | 9           | 74           |
| 19     | 10          | 138          |
| 19     | 11          | 380          |



## Urban Transportation Systems Engineering Lab

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|    |    |      |
|----|----|------|
| 19 | 12 | 416  |
| 19 | 13 | 1135 |
| 19 | 14 | 270  |
| 19 | 15 | 347  |
| 19 | 16 | 227  |
| 19 | 17 | 13   |
| 19 | 18 | 60   |
| 19 | 19 | 156  |
| 19 | 20 | 102  |
| 19 | 21 | 432  |
| 19 | 22 | 87   |
| 19 | 23 | 112  |
| 19 | 24 | 55   |
| 19 | 25 | 125  |
| 19 | 26 | 200  |





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| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 20     | 1           | 216          |
| 20     | 2           | 79           |
| 20     | 3           | 304          |
| 20     | 4           | 242          |
| 20     | 5           | 173          |
| 20     | 6           | 1113         |
| 20     | 7           | 825          |
| 20     | 8           | 129          |
| 20     | 9           | 124          |
| 20     | 10          | 234          |
| 20     | 11          | 640          |
| 20     | 12          | 701          |
| 20     | 13          | 1928         |
| 20     | 14          | 455          |



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|    |    |     |
|----|----|-----|
| 20 | 15 | 585 |
| 20 | 16 | 380 |
| 20 | 17 | 22  |
| 20 | 18 | 102 |
| 20 | 19 | 260 |
| 20 | 20 | 173 |
| 20 | 21 | 728 |
| 20 | 22 | 146 |
| 20 | 23 | 190 |
| 20 | 24 | 94  |
| 20 | 25 | 210 |
| 20 | 26 | 337 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 21     | 1           | 256          |



|    |    |      |
|----|----|------|
| 21 | 2  | 94   |
| 21 | 3  | 355  |
| 21 | 4  | 282  |
| 21 | 5  | 205  |
| 21 | 6  | 1310 |
| 21 | 7  | 966  |
| 21 | 8  | 152  |
| 21 | 9  | 145  |
| 21 | 10 | 274  |
| 21 | 11 | 749  |
| 21 | 12 | 823  |
| 21 | 13 | 2272 |
| 21 | 14 | 531  |
| 21 | 15 | 683  |
| 21 | 16 | 445  |



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|    |    |     |
|----|----|-----|
| 21 | 17 | 26  |
| 21 | 18 | 119 |
| 21 | 19 | 305 |
| 21 | 20 | 203 |
| 21 | 21 | 857 |
| 21 | 22 | 173 |
| 21 | 23 | 222 |
| 21 | 24 | 109 |
| 21 | 25 | 245 |
| 21 | 26 | 396 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 22     | 1           | 171          |
| 22     | 2           | 62           |
| 22     | 3           | 236          |



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|    |    |      |
|----|----|------|
| 22 | 4  | 188  |
| 22 | 5  | 136  |
| 22 | 6  | 866  |
| 22 | 7  | 638  |
| 22 | 8  | 101  |
| 22 | 9  | 95   |
| 22 | 10 | 176  |
| 22 | 11 | 492  |
| 22 | 12 | 543  |
| 22 | 13 | 1503 |
| 22 | 14 | 349  |
| 22 | 15 | 451  |
| 22 | 16 | 294  |
| 22 | 17 | 17   |
| 22 | 18 | 77   |



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|    |    |     |
|----|----|-----|
| 22 | 19 | 202 |
| 22 | 20 | 134 |
| 22 | 21 | 568 |
| 22 | 22 | 115 |
| 22 | 23 | 147 |
| 22 | 24 | 73  |
| 22 | 25 | 164 |
| 22 | 26 | 262 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 23     | 1           | 137          |
| 23     | 2           | 50           |
| 23     | 3           | 191          |
| 23     | 4           | 150          |
| 23     | 5           | 109          |



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|    |    |      |
|----|----|------|
| 23 | 6  | 699  |
| 23 | 7  | 517  |
| 23 | 8  | 81   |
| 23 | 9  | 77   |
| 23 | 10 | 146  |
| 23 | 11 | 400  |
| 23 | 12 | 439  |
| 23 | 13 | 1205 |
| 23 | 14 | 285  |
| 23 | 15 | 366  |
| 23 | 16 | 238  |
| 23 | 17 | 14   |
| 23 | 18 | 63   |
| 23 | 19 | 163  |
| 23 | 20 | 109  |



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|    |    |     |
|----|----|-----|
| 23 | 21 | 457 |
| 23 | 22 | 92  |
| 23 | 23 | 120 |
| 23 | 24 | 59  |
| 23 | 25 | 133 |
| 23 | 26 | 213 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 24     | 1           | 85           |
| 24     | 2           | 31           |
| 24     | 3           | 118          |
| 24     | 4           | 95           |
| 24     | 5           | 66           |
| 24     | 6           | 433          |
| 24     | 7           | 323          |





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|    |    |     |
|----|----|-----|
| 24 | 8  | 50  |
| 24 | 9  | 49  |
| 24 | 10 | 91  |
| 24 | 11 | 250 |
| 24 | 12 | 273 |
| 24 | 13 | 746 |
| 24 | 14 | 177 |
| 24 | 15 | 229 |
| 24 | 16 | 148 |
| 24 | 17 | 8   |
| 24 | 18 | 40  |
| 24 | 19 | 101 |
| 24 | 20 | 68  |
| 24 | 21 | 281 |
| 24 | 22 | 57  |



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|    |    |     |
|----|----|-----|
| 24 | 23 | 74  |
| 24 | 24 | 37  |
| 24 | 25 | 83  |
| 24 | 26 | 132 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 25     | 1           | 365          |
| 25     | 2           | 130          |
| 25     | 3           | 506          |
| 25     | 4           | 397          |
| 25     | 5           | 291          |
| 25     | 6           | 1834         |
| 25     | 7           | 1373         |
| 25     | 8           | 216          |
| 25     | 9           | 206          |



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|    |    |      |
|----|----|------|
| 25 | 10 | 390  |
| 25 | 11 | 1065 |
| 25 | 12 | 1160 |
| 25 | 13 | 3188 |
| 25 | 14 | 752  |
| 25 | 15 | 972  |
| 25 | 16 | 632  |
| 25 | 17 | 38   |
| 25 | 18 | 169  |
| 25 | 19 | 435  |
| 25 | 20 | 289  |
| 25 | 21 | 1199 |
| 25 | 22 | 245  |
| 25 | 23 | 316  |
| 25 | 24 | 158  |



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|    |    |     |
|----|----|-----|
| 25 | 25 | 356 |
| 25 | 26 | 568 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 26     | 1           | 73           |
| 26     | 2           | 27           |
| 26     | 3           | 104          |
| 26     | 4           | 82           |
| 26     | 5           | 59           |
| 26     | 6           | 384          |
| 26     | 7           | 283          |
| 26     | 8           | 44           |
| 26     | 9           | 42           |
| 26     | 10          | 80           |
| 26     | 11          | 220          |



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|    |    |     |
|----|----|-----|
| 26 | 12 | 241 |
| 26 | 13 | 661 |
| 26 | 14 | 156 |
| 26 | 15 | 199 |
| 26 | 16 | 130 |
| 26 | 17 | 7   |
| 26 | 18 | 35  |
| 26 | 19 | 90  |
| 26 | 20 | 59  |
| 26 | 21 | 250 |
| 26 | 22 | 51  |
| 26 | 23 | 65  |
| 26 | 24 | 32  |
| 26 | 25 | 73  |
| 26 | 26 | 117 |



Minimum Residual = 47437919.096686

Optimal Beta = 0.001

| Target Oi | Modelled Oi | Target Dj | Modelled Dj     |
|-----------|-------------|-----------|-----------------|
| 5528      | 5528        | 5582      | 5545.9093483239 |
| 8112      | 8112        | 2066      | 2045.9199099436 |
| 21826     | 21826       | 7781      | 7774.9263704269 |
| 9339      | 9339        | 6160      | 6155.2725686639 |
| 12153     | 12153       | 4492      | 4463.099373828  |
| 12186     | 12186       | 28105     | 28160.232156519 |
| 13641     | 13641       | 20838     | 20929.890565158 |
| 15803     | 15803       | 3326      | 3318.1366027454 |
| 17636     | 17636       | 3178      | 3177.2865841495 |
| 15354     | 15354       | 5948      | 5953.0419599945 |
| 17230     | 17230       | 16126     | 16183.155324675 |
| 5829      | 5829        | 17606     | 17656.434931706 |



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|       |       |       |                 |
|-------|-------|-------|-----------------|
| 5359  | 5359  | 48409 | 48422.163700178 |
| 6221  | 6221  | 11358 | 11380.589550461 |
| 9982  | 9982  | 14687 | 14726.959304365 |
| 9142  | 9142  | 9622  | 9635.7428792956 |
| 3569  | 3569  | 590   | 584.78574305634 |
| 5193  | 5193  | 2581  | 2575.5963386413 |
| 6174  | 6174  | 6572  | 6553.6752481334 |
| 10405 | 10405 | 4361  | 4352.5294826386 |
| 12209 | 12209 | 18286 | 18235.789566867 |
| 8076  | 8076  | 3702  | 3688.6750373262 |
| 6524  | 6524  | 4771  | 4755.0356863861 |
| 4057  | 4057  | 2386  | 2366.7149704149 |
| 17265 | 17265 | 5343  | 5292.1682039785 |
| 3578  | 3578  | 8515  | 8457.2685921237 |



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| Beta  | Residual SSE    |
|-------|-----------------|
| 0.001 | 47437919.096686 |
| 0.002 | 47437919.096686 |
| 0.003 | 47437919.096686 |
| 0.004 | 47437919.096686 |
| 0.005 | 47437919.096686 |
| 0.006 | 47437919.096686 |
| 0.007 | 47437919.096686 |
| 0.008 | 47437919.096686 |
| 0.009 | 47437919.096686 |
| 0.01  | 47437919.096686 |
| 0.011 | 47437919.096686 |
| 0.012 | 47437919.096686 |
| 0.013 | 47437919.096686 |
| 0.014 | 47437919.096686 |





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|       |                 |
|-------|-----------------|
| 0.015 | 47437919.096686 |
| 0.016 | 47437919.096686 |
| 0.017 | 47437919.096686 |
| 0.018 | 47437919.096686 |
| 0.019 | 47437919.096686 |
| 0.02  | 47437919.096686 |
| 0.021 | 47437919.096686 |
| 0.022 | 47437919.096686 |
| 0.023 | 47437919.096686 |
| 0.024 | 47437919.096686 |
| 0.025 | 47437919.096686 |
| 0.026 | 47437919.096686 |
| 0.027 | 47437919.096686 |
| 0.028 | 47437919.096686 |
| 0.029 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.03  | 47437919.096686 |
| 0.031 | 47437919.096686 |
| 0.032 | 47437919.096686 |
| 0.033 | 47437919.096686 |
| 0.034 | 47437919.096686 |
| 0.035 | 47437919.096686 |
| 0.036 | 47437919.096686 |
| 0.037 | 47437919.096686 |
| 0.038 | 47437919.096686 |
| 0.039 | 47437919.096686 |
| 0.04  | 47437919.096686 |
| 0.041 | 47437919.096686 |
| 0.042 | 47437919.096686 |
| 0.043 | 47437919.096686 |
| 0.044 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.045 | 47437919.096686 |
| 0.046 | 47437919.096686 |
| 0.047 | 47437919.096686 |
| 0.048 | 47437919.096686 |
| 0.049 | 47437919.096686 |
| 0.05  | 47437919.096686 |
| 0.051 | 47437919.096686 |
| 0.052 | 47437919.096686 |
| 0.053 | 47437919.096686 |
| 0.054 | 47437919.096686 |
| 0.055 | 47437919.096686 |
| 0.056 | 47437919.096686 |
| 0.057 | 47437919.096686 |
| 0.058 | 47437919.096686 |
| 0.059 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.06  | 47437919.096686 |
| 0.061 | 47437919.096686 |
| 0.062 | 47437919.096686 |
| 0.063 | 47437919.096686 |
| 0.064 | 47437919.096686 |
| 0.065 | 47437919.096686 |
| 0.066 | 47437919.096686 |
| 0.067 | 47437919.096686 |
| 0.068 | 47437919.096686 |
| 0.069 | 47437919.096686 |
| 0.07  | 47437919.096686 |
| 0.071 | 47437919.096686 |
| 0.072 | 47437919.096686 |
| 0.073 | 47437919.096686 |
| 0.074 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.075 | 47437919.096686 |
| 0.076 | 47437919.096686 |
| 0.077 | 47437919.096686 |
| 0.078 | 47437919.096686 |
| 0.079 | 47437919.096686 |
| 0.08  | 47437919.096686 |
| 0.081 | 47437919.096686 |
| 0.082 | 47437919.096686 |
| 0.083 | 47437919.096686 |
| 0.084 | 47437919.096686 |
| 0.085 | 47437919.096686 |
| 0.086 | 47437919.096686 |
| 0.087 | 47437919.096686 |
| 0.088 | 47437919.096686 |
| 0.089 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.09  | 47437919.096686 |
| 0.091 | 47437919.096686 |
| 0.092 | 47437919.096686 |
| 0.093 | 47437919.096686 |
| 0.094 | 47437919.096686 |
| 0.095 | 47437919.096686 |
| 0.096 | 47437919.096686 |
| 0.097 | 47437919.096686 |
| 0.098 | 47437919.096686 |
| 0.099 | 47437919.096686 |
| 0.1   | 47437919.096686 |
| 0.101 | 47437919.096686 |
| 0.102 | 47437919.096686 |
| 0.103 | 47437919.096686 |
| 0.104 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.105 | 47437919.096686 |
| 0.106 | 47437919.096686 |
| 0.107 | 47437919.096686 |
| 0.108 | 47437919.096686 |
| 0.109 | 47437919.096686 |
| 0.11  | 47437919.096686 |
| 0.111 | 47437919.096686 |
| 0.112 | 47437919.096686 |
| 0.113 | 47437919.096686 |
| 0.114 | 47437919.096686 |
| 0.115 | 47437919.096686 |
| 0.116 | 47437919.096686 |
| 0.117 | 47437919.096686 |
| 0.118 | 47437919.096686 |
| 0.119 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.12  | 47437919.096686 |
| 0.121 | 47437919.096686 |
| 0.122 | 47437919.096686 |
| 0.123 | 47437919.096686 |
| 0.124 | 47437919.096686 |
| 0.125 | 47437919.096686 |
| 0.126 | 47437919.096686 |
| 0.127 | 47437919.096686 |
| 0.128 | 47437919.096686 |
| 0.129 | 47437919.096686 |
| 0.13  | 47437919.096686 |
| 0.131 | 47437919.096686 |
| 0.132 | 47437919.096686 |
| 0.133 | 47437919.096686 |
| 0.134 | 47437919.096686 |





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|       |                 |
|-------|-----------------|
| 0.135 | 47437919.096686 |
| 0.136 | 47437919.096686 |
| 0.137 | 47437919.096686 |
| 0.138 | 47437919.096686 |
| 0.139 | 47437919.096686 |
| 0.14  | 47437919.096686 |
| 0.141 | 47437919.096686 |
| 0.142 | 47437919.096686 |
| 0.143 | 47437919.096686 |
| 0.144 | 47437919.096686 |
| 0.145 | 47437919.096686 |
| 0.146 | 47437919.096686 |
| 0.147 | 47437919.096686 |
| 0.148 | 47437919.096686 |
| 0.149 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.15  | 47437919.096686 |
| 0.151 | 47437919.096686 |
| 0.152 | 47437919.096686 |
| 0.153 | 47437919.096686 |
| 0.154 | 47437919.096686 |
| 0.155 | 47437919.096686 |
| 0.156 | 47437919.096686 |
| 0.157 | 47437919.096686 |
| 0.158 | 47437919.096686 |
| 0.159 | 47437919.096686 |
| 0.16  | 47437919.096686 |
| 0.161 | 47437919.096686 |
| 0.162 | 47437919.096686 |
| 0.163 | 47437919.096686 |
| 0.164 | 47437919.096686 |



---

|       |                 |
|-------|-----------------|
| 0.165 | 47437919.096686 |
| 0.166 | 47437919.096686 |
| 0.167 | 47437919.096686 |
| 0.168 | 47437919.096686 |
| 0.169 | 47437919.096686 |
| 0.17  | 47437919.096686 |
| 0.171 | 47437919.096686 |
| 0.172 | 47437919.096686 |
| 0.173 | 47437919.096686 |
| 0.174 | 47437919.096686 |
| 0.175 | 47437919.096686 |
| 0.176 | 47437919.096686 |
| 0.177 | 47437919.096686 |
| 0.178 | 47437919.096686 |
| 0.179 | 47437919.096686 |



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|       |                 |
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| 0.682 | 47437919.096686 |
| 0.683 | 47437919.096686 |
| 0.684 | 47437919.096686 |
| 0.685 | 47437919.096686 |
| 0.686 | 47437919.096686 |
| 0.687 | 47437919.096686 |
| 0.688 | 47437919.096686 |
| 0.689 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.69  | 47437919.096686 |
| 0.691 | 47437919.096686 |
| 0.692 | 47437919.096686 |
| 0.693 | 47437919.096686 |
| 0.694 | 47437919.096686 |
| 0.695 | 47437919.096686 |
| 0.696 | 47437919.096686 |
| 0.697 | 47437919.096686 |
| 0.698 | 47437919.096686 |
| 0.699 | 47437919.096686 |
| 0.7   | 47437919.096686 |
| 0.701 | 47437919.096686 |
| 0.702 | 47437919.096686 |
| 0.703 | 47437919.096686 |
| 0.704 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.705 | 47437919.096686 |
| 0.706 | 47437919.096686 |
| 0.707 | 47437919.096686 |
| 0.708 | 47437919.096686 |
| 0.709 | 47437919.096686 |
| 0.71  | 47437919.096686 |
| 0.711 | 47437919.096686 |
| 0.712 | 47437919.096686 |
| 0.713 | 47437919.096686 |
| 0.714 | 47437919.096686 |
| 0.715 | 47437919.096686 |
| 0.716 | 47437919.096686 |
| 0.717 | 47437919.096686 |
| 0.718 | 47437919.096686 |
| 0.719 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.72  | 47437919.096686 |
| 0.721 | 47437919.096686 |
| 0.722 | 47437919.096686 |
| 0.723 | 47437919.096686 |
| 0.724 | 47437919.096686 |
| 0.725 | 47437919.096686 |
| 0.726 | 47437919.096686 |
| 0.727 | 47437919.096686 |
| 0.728 | 47437919.096686 |
| 0.729 | 47437919.096686 |
| 0.73  | 47437919.096686 |
| 0.731 | 47437919.096686 |
| 0.732 | 47437919.096686 |
| 0.733 | 47437919.096686 |
| 0.734 | 47437919.096686 |





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|       |                 |
|-------|-----------------|
| 0.735 | 47437919.096686 |
| 0.736 | 47437919.096686 |
| 0.737 | 47437919.096686 |
| 0.738 | 47437919.096686 |
| 0.739 | 47437919.096686 |
| 0.74  | 47437919.096686 |
| 0.741 | 47437919.096686 |
| 0.742 | 47437919.096686 |
| 0.743 | 47437919.096686 |
| 0.744 | 47437919.096686 |
| 0.745 | 47437919.096686 |
| 0.746 | 47437919.096686 |
| 0.747 | 47437919.096686 |
| 0.748 | 47437919.096686 |
| 0.749 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.75  | 47437919.096686 |
| 0.751 | 47437919.096686 |
| 0.752 | 47437919.096686 |
| 0.753 | 47437919.096686 |
| 0.754 | 47437919.096686 |
| 0.755 | 47437919.096686 |
| 0.756 | 47437919.096686 |
| 0.757 | 47437919.096686 |
| 0.758 | 47437919.096686 |
| 0.759 | 47437919.096686 |
| 0.76  | 47437919.096686 |
| 0.761 | 47437919.096686 |
| 0.762 | 47437919.096686 |
| 0.763 | 47437919.096686 |
| 0.764 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.765 | 47437919.096686 |
| 0.766 | 47437919.096686 |
| 0.767 | 47437919.096686 |
| 0.768 | 47437919.096686 |
| 0.769 | 47437919.096686 |
| 0.77  | 47437919.096686 |
| 0.771 | 47437919.096686 |
| 0.772 | 47437919.096686 |
| 0.773 | 47437919.096686 |
| 0.774 | 47437919.096686 |
| 0.775 | 47437919.096686 |
| 0.776 | 47437919.096686 |
| 0.777 | 47437919.096686 |
| 0.778 | 47437919.096686 |
| 0.779 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.78  | 47437919.096686 |
| 0.781 | 47437919.096686 |
| 0.782 | 47437919.096686 |
| 0.783 | 47437919.096686 |
| 0.784 | 47437919.096686 |
| 0.785 | 47437919.096686 |
| 0.786 | 47437919.096686 |
| 0.787 | 47437919.096686 |
| 0.788 | 47437919.096686 |
| 0.789 | 47437919.096686 |
| 0.79  | 47437919.096686 |
| 0.791 | 47437919.096686 |
| 0.792 | 47437919.096686 |
| 0.793 | 47437919.096686 |
| 0.794 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.795 | 47437919.096686 |
| 0.796 | 47437919.096686 |
| 0.797 | 47437919.096686 |
| 0.798 | 47437919.096686 |
| 0.799 | 47437919.096686 |
| 0.8   | 47437919.096686 |
| 0.801 | 47437919.096686 |
| 0.802 | 47437919.096686 |
| 0.803 | 47437919.096686 |
| 0.804 | 47437919.096686 |
| 0.805 | 47437919.096686 |
| 0.806 | 47437919.096686 |
| 0.807 | 47437919.096686 |
| 0.808 | 47437919.096686 |
| 0.809 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.81  | 47437919.096686 |
| 0.811 | 47437919.096686 |
| 0.812 | 47437919.096686 |
| 0.813 | 47437919.096686 |
| 0.814 | 47437919.096686 |
| 0.815 | 47437919.096686 |
| 0.816 | 47437919.096686 |
| 0.817 | 47437919.096686 |
| 0.818 | 47437919.096686 |
| 0.819 | 47437919.096686 |
| 0.82  | 47437919.096686 |
| 0.821 | 47437919.096686 |
| 0.822 | 47437919.096686 |
| 0.823 | 47437919.096686 |
| 0.824 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.825 | 47437919.096686 |
| 0.826 | 47437919.096686 |
| 0.827 | 47437919.096686 |
| 0.828 | 47437919.096686 |
| 0.829 | 47437919.096686 |
| 0.83  | 47437919.096686 |
| 0.831 | 47437919.096686 |
| 0.832 | 47437919.096686 |
| 0.833 | 47437919.096686 |
| 0.834 | 47437919.096686 |
| 0.835 | 47437919.096686 |
| 0.836 | 47437919.096686 |
| 0.837 | 47437919.096686 |
| 0.838 | 47437919.096686 |
| 0.839 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.84  | 47437919.096686 |
| 0.841 | 47437919.096686 |
| 0.842 | 47437919.096686 |
| 0.843 | 47437919.096686 |
| 0.844 | 47437919.096686 |
| 0.845 | 47437919.096686 |
| 0.846 | 47437919.096686 |
| 0.847 | 47437919.096686 |
| 0.848 | 47437919.096686 |
| 0.849 | 47437919.096686 |
| 0.85  | 47437919.096686 |
| 0.851 | 47437919.096686 |
| 0.852 | 47437919.096686 |
| 0.853 | 47437919.096686 |
| 0.854 | 47437919.096686 |





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|       |                 |
|-------|-----------------|
| 0.855 | 47437919.096686 |
| 0.856 | 47437919.096686 |
| 0.857 | 47437919.096686 |
| 0.858 | 47437919.096686 |
| 0.859 | 47437919.096686 |
| 0.86  | 47437919.096686 |
| 0.861 | 47437919.096686 |
| 0.862 | 47437919.096686 |
| 0.863 | 47437919.096686 |
| 0.864 | 47437919.096686 |
| 0.865 | 47437919.096686 |
| 0.866 | 47437919.096686 |
| 0.867 | 47437919.096686 |
| 0.868 | 47437919.096686 |
| 0.869 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.87  | 47437919.096686 |
| 0.871 | 47437919.096686 |
| 0.872 | 47437919.096686 |
| 0.873 | 47437919.096686 |
| 0.874 | 47437919.096686 |
| 0.875 | 47437919.096686 |
| 0.876 | 47437919.096686 |
| 0.877 | 47437919.096686 |
| 0.878 | 47437919.096686 |
| 0.879 | 47437919.096686 |
| 0.88  | 47437919.096686 |
| 0.881 | 47437919.096686 |
| 0.882 | 47437919.096686 |
| 0.883 | 47437919.096686 |
| 0.884 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.885 | 47437919.096686 |
| 0.886 | 47437919.096686 |
| 0.887 | 47437919.096686 |
| 0.888 | 47437919.096686 |
| 0.889 | 47437919.096686 |
| 0.89  | 47437919.096686 |
| 0.891 | 47437919.096686 |
| 0.892 | 47437919.096686 |
| 0.893 | 47437919.096686 |
| 0.894 | 47437919.096686 |
| 0.895 | 47437919.096686 |
| 0.896 | 47437919.096686 |
| 0.897 | 47437919.096686 |
| 0.898 | 47437919.096686 |
| 0.899 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.9   | 47437919.096686 |
| 0.901 | 47437919.096686 |
| 0.902 | 47437919.096686 |
| 0.903 | 47437919.096686 |
| 0.904 | 47437919.096686 |
| 0.905 | 47437919.096686 |
| 0.906 | 47437919.096686 |
| 0.907 | 47437919.096686 |
| 0.908 | 47437919.096686 |
| 0.909 | 47437919.096686 |
| 0.91  | 47437919.096686 |
| 0.911 | 47437919.096686 |
| 0.912 | 47437919.096686 |
| 0.913 | 47437919.096686 |
| 0.914 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.915 | 47437919.096686 |
| 0.916 | 47437919.096686 |
| 0.917 | 47437919.096686 |
| 0.918 | 47437919.096686 |
| 0.919 | 47437919.096686 |
| 0.92  | 47437919.096686 |
| 0.921 | 47437919.096686 |
| 0.922 | 47437919.096686 |
| 0.923 | 47437919.096686 |
| 0.924 | 47437919.096686 |
| 0.925 | 47437919.096686 |
| 0.926 | 47437919.096686 |
| 0.927 | 47437919.096686 |
| 0.928 | 47437919.096686 |
| 0.929 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.93  | 47437919.096686 |
| 0.931 | 47437919.096686 |
| 0.932 | 47437919.096686 |
| 0.933 | 47437919.096686 |
| 0.934 | 47437919.096686 |
| 0.935 | 47437919.096686 |
| 0.936 | 47437919.096686 |
| 0.937 | 47437919.096686 |
| 0.938 | 47437919.096686 |
| 0.939 | 47437919.096686 |
| 0.94  | 47437919.096686 |
| 0.941 | 47437919.096686 |
| 0.942 | 47437919.096686 |
| 0.943 | 47437919.096686 |
| 0.944 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.945 | 47437919.096686 |
| 0.946 | 47437919.096686 |
| 0.947 | 47437919.096686 |
| 0.948 | 47437919.096686 |
| 0.949 | 47437919.096686 |
| 0.95  | 47437919.096686 |
| 0.951 | 47437919.096686 |
| 0.952 | 47437919.096686 |
| 0.953 | 47437919.096686 |
| 0.954 | 47437919.096686 |
| 0.955 | 47437919.096686 |
| 0.956 | 47437919.096686 |
| 0.957 | 47437919.096686 |
| 0.958 | 47437919.096686 |
| 0.959 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.96  | 47437919.096686 |
| 0.961 | 47437919.096686 |
| 0.962 | 47437919.096686 |
| 0.963 | 47437919.096686 |
| 0.964 | 47437919.096686 |
| 0.965 | 47437919.096686 |
| 0.966 | 47437919.096686 |
| 0.967 | 47437919.096686 |
| 0.968 | 47437919.096686 |
| 0.969 | 47437919.096686 |
| 0.97  | 47437919.096686 |
| 0.971 | 47437919.096686 |
| 0.972 | 47437919.096686 |
| 0.973 | 47437919.096686 |
| 0.974 | 47437919.096686 |





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|       |                 |
|-------|-----------------|
| 0.975 | 47437919.096686 |
| 0.976 | 47437919.096686 |
| 0.977 | 47437919.096686 |
| 0.978 | 47437919.096686 |
| 0.979 | 47437919.096686 |
| 0.98  | 47437919.096686 |
| 0.981 | 47437919.096686 |
| 0.982 | 47437919.096686 |
| 0.983 | 47437919.096686 |
| 0.984 | 47437919.096686 |
| 0.985 | 47437919.096686 |
| 0.986 | 47437919.096686 |
| 0.987 | 47437919.096686 |
| 0.988 | 47437919.096686 |
| 0.989 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.99  | 47437919.096686 |
| 0.991 | 47437919.096686 |
| 0.992 | 47437919.096686 |
| 0.993 | 47437919.096686 |
| 0.994 | 47437919.096686 |
| 0.995 | 47437919.096686 |
| 0.996 | 47437919.096686 |
| 0.997 | 47437919.096686 |
| 0.998 | 47437919.096686 |
| 0.999 | 47437919.096686 |



## Experiment No. 7

October 30, 2021, 7:18 pm

### Calibration Of Singly Constrained Gravity Model (Origin)

Input Values :

| Base Year Origin-Destination Cost Matrix |             |      |
|------------------------------------------|-------------|------|
| Origin                                   | Destination | Cost |
| 1                                        | 1           | 28   |
| 1                                        | 2           | 23   |
| 1                                        | 3           | 28   |
| 1                                        | 4           | 24   |
| 1                                        | 5           | 31   |
| 1                                        | 6           | 35   |
| 1                                        | 7           | 31   |
| 1                                        | 8           | 41   |
| 1                                        | 9           | 22   |
| 1                                        | 10          | 38   |



|   |    |    |
|---|----|----|
| 1 | 11 | 46 |
| 1 | 12 | 32 |
| 1 | 13 | 41 |
| 1 | 14 | 45 |
| 1 | 15 | 35 |
| 1 | 16 | 34 |
| 1 | 17 | 39 |
| 1 | 18 | 33 |
| 1 | 19 | 76 |
| 1 | 20 | 55 |
| 1 | 21 | 35 |
| 1 | 22 | 38 |
| 1 | 23 | 48 |
| 1 | 24 | 52 |
| 1 | 25 | 44 |



---

|   |    |    |
|---|----|----|
| 1 | 26 | 41 |
|---|----|----|

| Origin | Destination | Cost |
|--------|-------------|------|
| 2      | 1           | 29   |
| 2      | 2           | 26   |
| 2      | 3           | 27   |
| 2      | 4           | 23   |
| 2      | 5           | 39   |
| 2      | 6           | 34   |
| 2      | 7           | 28   |
| 2      | 8           | 40   |
| 2      | 9           | 34   |
| 2      | 10          | 35   |
| 2      | 11          | 33   |
| 2      | 12          | 46   |



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|   |    |    |
|---|----|----|
| 2 | 13 | 31 |
| 2 | 14 | 47 |
| 2 | 15 | 33 |
| 2 | 16 | 20 |
| 2 | 17 | 71 |
| 2 | 18 | 45 |
| 2 | 19 | 35 |
| 2 | 20 | 46 |
| 2 | 21 | 45 |
| 2 | 22 | 35 |
| 2 | 23 | 50 |
| 2 | 24 | 60 |
| 2 | 25 | 67 |
| 2 | 26 | 43 |



| Origin | Destination | Cost |
|--------|-------------|------|
| 3      | 1           | 31   |
| 3      | 2           | 31   |
| 3      | 3           | 20   |
| 3      | 4           | 24   |
| 3      | 5           | 28   |
| 3      | 6           | 29   |
| 3      | 7           | 24   |
| 3      | 8           | 27   |
| 3      | 9           | 24   |
| 3      | 10          | 29   |
| 3      | 11          | 30   |
| 3      | 12          | 33   |
| 3      | 13          | 40   |
| 3      | 14          | 36   |



|   |    |    |
|---|----|----|
| 3 | 15 | 34 |
| 3 | 16 | 31 |
| 3 | 17 | 29 |
| 3 | 18 | 28 |
| 3 | 19 | 37 |
| 3 | 20 | 41 |
| 3 | 21 | 44 |
| 3 | 22 | 38 |
| 3 | 23 | 45 |
| 3 | 24 | 41 |
| 3 | 25 | 45 |
| 3 | 26 | 47 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 4      | 1           | 31   |





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|   |    |    |
|---|----|----|
| 4 | 2  | 24 |
| 4 | 3  | 24 |
| 4 | 4  | 20 |
| 4 | 5  | 24 |
| 4 | 6  | 29 |
| 4 | 7  | 24 |
| 4 | 8  | 28 |
| 4 | 9  | 27 |
| 4 | 10 | 33 |
| 4 | 11 | 30 |
| 4 | 12 | 34 |
| 4 | 13 | 38 |
| 4 | 14 | 36 |
| 4 | 15 | 33 |
| 4 | 16 | 42 |



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|   |    |    |
|---|----|----|
| 4 | 17 | 38 |
| 4 | 18 | 40 |
| 4 | 19 | 39 |
| 4 | 20 | 35 |
| 4 | 21 | 38 |
| 4 | 22 | 35 |
| 4 | 23 | 48 |
| 4 | 24 | 60 |
| 4 | 25 | 63 |
| 4 | 26 | 53 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 5      | 1           | 37   |
| 5      | 2           | 38   |
| 5      | 3           | 33   |



|   |    |    |
|---|----|----|
| 5 | 4  | 24 |
| 5 | 5  | 22 |
| 5 | 6  | 31 |
| 5 | 7  | 27 |
| 5 | 8  | 28 |
| 5 | 9  | 29 |
| 5 | 10 | 36 |
| 5 | 11 | 30 |
| 5 | 12 | 35 |
| 5 | 13 | 39 |
| 5 | 14 | 36 |
| 5 | 15 | 31 |
| 5 | 16 | 41 |
| 5 | 17 | 41 |
| 5 | 18 | 57 |



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|   |    |    |
|---|----|----|
| 5 | 19 | 41 |
| 5 | 20 | 49 |
| 5 | 21 | 56 |
| 5 | 22 | 43 |
| 5 | 23 | 39 |
| 5 | 24 | 47 |
| 5 | 25 | 52 |
| 5 | 26 | 53 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 6      | 1           | 40   |
| 6      | 2           | 35   |
| 6      | 3           | 29   |
| 6      | 4           | 31   |
| 6      | 5           | 33   |



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|   |    |    |
|---|----|----|
| 6 | 6  | 20 |
| 6 | 7  | 26 |
| 6 | 8  | 32 |
| 6 | 9  | 33 |
| 6 | 10 | 27 |
| 6 | 11 | 25 |
| 6 | 12 | 21 |
| 6 | 13 | 23 |
| 6 | 14 | 28 |
| 6 | 15 | 29 |
| 6 | 16 | 27 |
| 6 | 17 | 42 |
| 6 | 18 | 32 |
| 6 | 19 | 34 |
| 6 | 20 | 31 |



|   |    |    |
|---|----|----|
| 6 | 21 | 25 |
| 6 | 22 | 34 |
| 6 | 23 | 32 |
| 6 | 24 | 45 |
| 6 | 25 | 52 |
| 6 | 26 | 42 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 7      | 1           | 32   |
| 7      | 2           | 33   |
| 7      | 3           | 27   |
| 7      | 4           | 28   |
| 7      | 5           | 28   |
| 7      | 6           | 23   |
| 7      | 7           | 20   |



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|   |    |    |
|---|----|----|
| 7 | 8  | 29 |
| 7 | 9  | 24 |
| 7 | 10 | 24 |
| 7 | 11 | 24 |
| 7 | 12 | 23 |
| 7 | 13 | 29 |
| 7 | 14 | 26 |
| 7 | 15 | 30 |
| 7 | 16 | 34 |
| 7 | 17 | 43 |
| 7 | 18 | 30 |
| 7 | 19 | 34 |
| 7 | 20 | 32 |
| 7 | 21 | 32 |
| 7 | 22 | 41 |



---

|   |    |    |
|---|----|----|
| 7 | 23 | 30 |
| 7 | 24 | 38 |
| 7 | 25 | 39 |
| 7 | 26 | 37 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 8      | 1           | 41   |
| 8      | 2           | 39   |
| 8      | 3           | 25   |
| 8      | 4           | 25   |
| 8      | 5           | 32   |
| 8      | 6           | 32   |
| 8      | 7           | 26   |
| 8      | 8           | 25   |
| 8      | 9           | 25   |





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|   |    |    |
|---|----|----|
| 8 | 10 | 22 |
| 8 | 11 | 28 |
| 8 | 12 | 37 |
| 8 | 13 | 39 |
| 8 | 14 | 39 |
| 8 | 15 | 34 |
| 8 | 16 | 28 |
| 8 | 17 | 31 |
| 8 | 18 | 45 |
| 8 | 19 | 51 |
| 8 | 20 | 50 |
| 8 | 21 | 42 |
| 8 | 22 | 41 |
| 8 | 23 | 57 |
| 8 | 24 | 53 |



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|   |    |    |
|---|----|----|
| 8 | 25 | 48 |
| 8 | 26 | 47 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 9      | 1           | 24   |
| 9      | 2           | 34   |
| 9      | 3           | 23   |
| 9      | 4           | 24   |
| 9      | 5           | 40   |
| 9      | 6           | 30   |
| 9      | 7           | 25   |
| 9      | 8           | 27   |
| 9      | 9           | 19   |
| 9      | 10          | 22   |
| 9      | 11          | 26   |



|   |    |    |
|---|----|----|
| 9 | 12 | 33 |
| 9 | 13 | 39 |
| 9 | 14 | 34 |
| 9 | 15 | 31 |
| 9 | 16 | 26 |
| 9 | 17 | 34 |
| 9 | 18 | 29 |
| 9 | 19 | 40 |
| 9 | 20 | 37 |
| 9 | 21 | 43 |
| 9 | 22 | 50 |
| 9 | 23 | 43 |
| 9 | 24 | 38 |
| 9 | 25 | 47 |
| 9 | 26 | 49 |



| Origin | Destination | Cost |
|--------|-------------|------|
| 10     | 1           | 39   |
| 10     | 2           | 29   |
| 10     | 3           | 30   |
| 10     | 4           | 29   |
| 10     | 5           | 38   |
| 10     | 6           | 25   |
| 10     | 7           | 20   |
| 10     | 8           | 27   |
| 10     | 9           | 22   |
| 10     | 10          | 20   |
| 10     | 11          | 23   |
| 10     | 12          | 25   |
| 10     | 13          | 34   |
| 10     | 14          | 38   |



|    |    |    |
|----|----|----|
| 10 | 15 | 27 |
| 10 | 16 | 25 |
| 10 | 17 | 37 |
| 10 | 18 | 25 |
| 10 | 19 | 35 |
| 10 | 20 | 37 |
| 10 | 21 | 37 |
| 10 | 22 | 45 |
| 10 | 23 | 41 |
| 10 | 24 | 46 |
| 10 | 25 | 40 |
| 10 | 26 | 48 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 11     | 1           | 50   |



|    |    |    |
|----|----|----|
| 11 | 2  | 47 |
| 11 | 3  | 30 |
| 11 | 4  | 31 |
| 11 | 5  | 33 |
| 11 | 6  | 23 |
| 11 | 7  | 24 |
| 11 | 8  | 28 |
| 11 | 9  | 26 |
| 11 | 10 | 23 |
| 11 | 11 | 20 |
| 11 | 12 | 23 |
| 11 | 13 | 25 |
| 11 | 14 | 24 |
| 11 | 15 | 26 |
| 11 | 16 | 22 |



|    |    |    |
|----|----|----|
| 11 | 17 | 30 |
| 11 | 18 | 31 |
| 11 | 19 | 30 |
| 11 | 20 | 28 |
| 11 | 21 | 29 |
| 11 | 22 | 37 |
| 11 | 23 | 31 |
| 11 | 24 | 36 |
| 11 | 25 | 37 |
| 11 | 26 | 33 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 12     | 1           | 35   |
| 12     | 2           | 40   |
| 12     | 3           | 35   |



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|    |    |    |
|----|----|----|
| 12 | 4  | 33 |
| 12 | 5  | 33 |
| 12 | 6  | 22 |
| 12 | 7  | 27 |
| 12 | 8  | 36 |
| 12 | 9  | 34 |
| 12 | 10 | 27 |
| 12 | 11 | 25 |
| 12 | 12 | 18 |
| 12 | 13 | 20 |
| 12 | 14 | 20 |
| 12 | 15 | 24 |
| 12 | 16 | 31 |
| 12 | 17 | 35 |
| 12 | 18 | 29 |





|    |    |    |
|----|----|----|
| 12 | 19 | 30 |
| 12 | 20 | 27 |
| 12 | 21 | 23 |
| 12 | 22 | 28 |
| 12 | 23 | 27 |
| 12 | 24 | 41 |
| 12 | 25 | 36 |
| 12 | 26 | 31 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 13     | 1           | 46   |
| 13     | 2           | 49   |
| 13     | 3           | 42   |
| 13     | 4           | 39   |
| 13     | 5           | 42   |



---

|    |    |    |
|----|----|----|
| 13 | 6  | 23 |
| 13 | 7  | 30 |
| 13 | 8  | 39 |
| 13 | 9  | 40 |
| 13 | 10 | 34 |
| 13 | 11 | 27 |
| 13 | 12 | 21 |
| 13 | 13 | 18 |
| 13 | 14 | 20 |
| 13 | 15 | 28 |
| 13 | 16 | 33 |
| 13 | 17 | 40 |
| 13 | 18 | 32 |
| 13 | 19 | 33 |
| 13 | 20 | 25 |



---

|    |    |    |
|----|----|----|
| 13 | 21 | 21 |
| 13 | 22 | 27 |
| 13 | 23 | 31 |
| 13 | 24 | 38 |
| 13 | 25 | 40 |
| 13 | 26 | 33 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 14     | 1           | 44   |
| 14     | 2           | 39   |
| 14     | 3           | 40   |
| 14     | 4           | 34   |
| 14     | 5           | 46   |
| 14     | 6           | 25   |
| 14     | 7           | 26   |



---

|    |    |    |
|----|----|----|
| 14 | 8  | 35 |
| 14 | 9  | 38 |
| 14 | 10 | 27 |
| 14 | 11 | 23 |
| 14 | 12 | 18 |
| 14 | 13 | 19 |
| 14 | 14 | 15 |
| 14 | 15 | 19 |
| 14 | 16 | 25 |
| 14 | 17 | 35 |
| 14 | 18 | 34 |
| 14 | 19 | 20 |
| 14 | 20 | 20 |
| 14 | 21 | 23 |
| 14 | 22 | 27 |



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|    |    |    |
|----|----|----|
| 14 | 23 | 22 |
| 14 | 24 | 34 |
| 14 | 25 | 31 |
| 14 | 26 | 29 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 15     | 1           | 49   |
| 15     | 2           | 52   |
| 15     | 3           | 35   |
| 15     | 4           | 35   |
| 15     | 5           | 43   |
| 15     | 6           | 30   |
| 15     | 7           | 29   |
| 15     | 8           | 32   |
| 15     | 9           | 32   |



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|    |    |    |
|----|----|----|
| 15 | 10 | 29 |
| 15 | 11 | 24 |
| 15 | 12 | 24 |
| 15 | 13 | 29 |
| 15 | 14 | 20 |
| 15 | 15 | 21 |
| 15 | 16 | 24 |
| 15 | 17 | 26 |
| 15 | 18 | 28 |
| 15 | 19 | 26 |
| 15 | 20 | 27 |
| 15 | 21 | 27 |
| 15 | 22 | 32 |
| 15 | 23 | 25 |
| 15 | 24 | 30 |



---

|    |    |    |
|----|----|----|
| 15 | 25 | 34 |
| 15 | 26 | 39 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 16     | 1           | 36   |
| 16     | 2           | 33   |
| 16     | 3           | 32   |
| 16     | 4           | 41   |
| 16     | 5           | 41   |
| 16     | 6           | 28   |
| 16     | 7           | 26   |
| 16     | 8           | 30   |
| 16     | 9           | 28   |
| 16     | 10          | 25   |
| 16     | 11          | 32   |



---

|    |    |    |
|----|----|----|
| 16 | 12 | 31 |
| 16 | 13 | 28 |
| 16 | 14 | 27 |
| 16 | 15 | 24 |
| 16 | 16 | 27 |
| 16 | 17 | 30 |
| 16 | 18 | 24 |
| 16 | 19 | 32 |
| 16 | 20 | 30 |
| 16 | 21 | 33 |
| 16 | 22 | 38 |
| 16 | 23 | 35 |
| 16 | 24 | 43 |
| 16 | 25 | 39 |
| 16 | 26 | 38 |





| Origin | Destination | Cost |
|--------|-------------|------|
| 17     | 1           | 29   |
| 17     | 2           | 10   |
| 17     | 3           | 24   |
| 17     | 4           | 29   |
| 17     | 5           | 50   |
| 17     | 6           | 41   |
| 17     | 7           | 42   |
| 17     | 8           | 31   |
| 17     | 9           | 37   |
| 17     | 10          | 37   |
| 17     | 11          | 27   |
| 17     | 12          | 35   |
| 17     | 13          | 42   |
| 17     | 14          | 34   |



|    |    |    |
|----|----|----|
| 17 | 15 | 23 |
| 17 | 16 | 27 |
| 17 | 17 | 22 |
| 17 | 18 | 32 |
| 17 | 19 | 25 |
| 17 | 20 | 50 |
| 17 | 21 | 48 |
| 17 | 22 | 52 |
| 17 | 23 | 42 |
| 17 | 24 | 42 |
| 17 | 25 | 90 |
| 17 | 26 | 60 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 18     | 1           | 39   |



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|    |    |    |
|----|----|----|
| 18 | 2  | 65 |
| 18 | 3  | 32 |
| 18 | 4  | 41 |
| 18 | 5  | 42 |
| 18 | 6  | 51 |
| 18 | 7  | 28 |
| 18 | 8  | 35 |
| 18 | 9  | 30 |
| 18 | 10 | 26 |
| 18 | 11 | 27 |
| 18 | 12 | 27 |
| 18 | 13 | 32 |
| 18 | 14 | 30 |
| 18 | 15 | 27 |
| 18 | 16 | 23 |



|    |    |    |
|----|----|----|
| 18 | 17 | 33 |
| 18 | 18 | 17 |
| 18 | 19 | 32 |
| 18 | 20 | 26 |
| 18 | 21 | 36 |
| 18 | 22 | 45 |
| 18 | 23 | 29 |
| 18 | 24 | 34 |
| 18 | 25 | 39 |
| 18 | 26 | 40 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 19     | 1           | 41   |
| 19     | 2           | 39   |
| 19     | 3           | 36   |



---

|    |    |    |
|----|----|----|
| 19 | 4  | 43 |
| 19 | 5  | 38 |
| 19 | 6  | 36 |
| 19 | 7  | 33 |
| 19 | 8  | 52 |
| 19 | 9  | 41 |
| 19 | 10 | 40 |
| 19 | 11 | 29 |
| 19 | 12 | 27 |
| 19 | 13 | 35 |
| 19 | 14 | 19 |
| 19 | 15 | 26 |
| 19 | 16 | 29 |
| 19 | 17 | 58 |
| 19 | 18 | 30 |



---

|    |    |    |
|----|----|----|
| 19 | 19 | 20 |
| 19 | 20 | 32 |
| 19 | 21 | 28 |
| 19 | 22 | 33 |
| 19 | 23 | 31 |
| 19 | 24 | 36 |
| 19 | 25 | 33 |
| 19 | 26 | 29 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 20     | 1           | 50   |
| 20     | 2           | 57   |
| 20     | 3           | 42   |
| 20     | 4           | 36   |
| 20     | 5           | 54   |



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|    |    |    |
|----|----|----|
| 20 | 6  | 30 |
| 20 | 7  | 30 |
| 20 | 8  | 48 |
| 20 | 9  | 41 |
| 20 | 10 | 35 |
| 20 | 11 | 28 |
| 20 | 12 | 25 |
| 20 | 13 | 25 |
| 20 | 14 | 19 |
| 20 | 15 | 25 |
| 20 | 16 | 33 |
| 20 | 17 | 75 |
| 20 | 18 | 29 |
| 20 | 19 | 29 |
| 20 | 20 | 25 |



|    |    |    |
|----|----|----|
| 20 | 21 | 25 |
| 20 | 22 | 29 |
| 20 | 23 | 21 |
| 20 | 24 | 29 |
| 20 | 25 | 35 |
| 20 | 26 | 30 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 21     | 1           | 41   |
| 21     | 2           | 47   |
| 21     | 3           | 48   |
| 21     | 4           | 43   |
| 21     | 5           | 46   |
| 21     | 6           | 27   |
| 21     | 7           | 32   |





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|    |    |    |
|----|----|----|
| 21 | 8  | 43 |
| 21 | 9  | 44 |
| 21 | 10 | 38 |
| 21 | 11 | 30 |
| 21 | 12 | 24 |
| 21 | 13 | 20 |
| 21 | 14 | 23 |
| 21 | 15 | 29 |
| 21 | 16 | 33 |
| 21 | 17 | 50 |
| 21 | 18 | 36 |
| 21 | 19 | 30 |
| 21 | 20 | 24 |
| 21 | 21 | 21 |
| 21 | 22 | 22 |



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|    |    |    |
|----|----|----|
| 21 | 23 | 26 |
| 21 | 24 | 44 |
| 21 | 25 | 41 |
| 21 | 26 | 27 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 22     | 1           | 36   |
| 22     | 2           | 45   |
| 22     | 3           | 44   |
| 22     | 4           | 36   |
| 22     | 5           | 45   |
| 22     | 6           | 30   |
| 22     | 7           | 36   |
| 22     | 8           | 41   |
| 22     | 9           | 51   |



---

|    |    |    |
|----|----|----|
| 22 | 10 | 68 |
| 22 | 11 | 40 |
| 22 | 12 | 29 |
| 22 | 13 | 23 |
| 22 | 14 | 31 |
| 22 | 15 | 33 |
| 22 | 16 | 37 |
| 22 | 17 | 53 |
| 22 | 18 | 54 |
| 22 | 19 | 33 |
| 22 | 20 | 28 |
| 22 | 21 | 21 |
| 22 | 22 | 16 |
| 22 | 23 | 25 |
| 22 | 24 | 30 |



---

|    |    |    |
|----|----|----|
| 22 | 25 | 30 |
| 22 | 26 | 29 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 23     | 1           | 41   |
| 23     | 2           | 55   |
| 23     | 3           | 41   |
| 23     | 4           | 45   |
| 23     | 5           | 53   |
| 23     | 6           | 30   |
| 23     | 7           | 31   |
| 23     | 8           | 48   |
| 23     | 9           | 54   |
| 23     | 10          | 39   |
| 23     | 11          | 31   |



---

|    |    |    |
|----|----|----|
| 23 | 12 | 27 |
| 23 | 13 | 29 |
| 23 | 14 | 21 |
| 23 | 15 | 26 |
| 23 | 16 | 34 |
| 23 | 17 | 36 |
| 23 | 18 | 38 |
| 23 | 19 | 28 |
| 23 | 20 | 20 |
| 23 | 21 | 25 |
| 23 | 22 | 26 |
| 23 | 23 | 18 |
| 23 | 24 | 20 |
| 23 | 25 | 25 |
| 23 | 26 | 23 |



| Origin | Destination | Cost |
|--------|-------------|------|
| 24     | 1           | 47   |
| 24     | 2           | 60   |
| 24     | 3           | 52   |
| 24     | 4           | 36   |
| 24     | 5           | 75   |
| 24     | 6           | 42   |
| 24     | 7           | 35   |
| 24     | 8           | 53   |
| 24     | 9           | 31   |
| 24     | 10          | 48   |
| 24     | 11          | 34   |
| 24     | 12          | 33   |
| 24     | 13          | 41   |
| 24     | 14          | 30   |



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|    |    |    |
|----|----|----|
| 24 | 15 | 30 |
| 24 | 16 | 43 |
| 24 | 17 | 57 |
| 24 | 18 | 33 |
| 24 | 19 | 35 |
| 24 | 20 | 26 |
| 24 | 21 | 44 |
| 24 | 22 | 30 |
| 24 | 23 | 29 |
| 24 | 24 | 20 |
| 24 | 25 | 27 |
| 24 | 26 | 36 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 25     | 1           | 41   |



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|    |    |    |
|----|----|----|
| 25 | 2  | 80 |
| 25 | 3  | 48 |
| 25 | 4  | 56 |
| 25 | 5  | 50 |
| 25 | 6  | 45 |
| 25 | 7  | 35 |
| 25 | 8  | 46 |
| 25 | 9  | 51 |
| 25 | 10 | 40 |
| 25 | 11 | 33 |
| 25 | 12 | 35 |
| 25 | 13 | 36 |
| 25 | 14 | 30 |
| 25 | 15 | 31 |
| 25 | 16 | 38 |





|    |    |    |
|----|----|----|
| 25 | 17 | 52 |
| 25 | 18 | 37 |
| 25 | 19 | 31 |
| 25 | 20 | 29 |
| 25 | 21 | 40 |
| 25 | 22 | 28 |
| 25 | 23 | 28 |
| 25 | 24 | 28 |
| 25 | 25 | 23 |
| 25 | 26 | 22 |

| Origin | Destination | Cost |
|--------|-------------|------|
| 26     | 1           | 70   |
| 26     | 2           | 65   |
| 26     | 3           | 50   |



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|    |    |    |
|----|----|----|
| 26 | 4  | 55 |
| 26 | 5  | 58 |
| 26 | 6  | 33 |
| 26 | 7  | 39 |
| 26 | 8  | 53 |
| 26 | 9  | 50 |
| 26 | 10 | 39 |
| 26 | 11 | 35 |
| 26 | 12 | 31 |
| 26 | 13 | 33 |
| 26 | 14 | 27 |
| 26 | 15 | 39 |
| 26 | 16 | 39 |
| 26 | 17 | 60 |
| 26 | 18 | 37 |



|    |    |    |
|----|----|----|
| 26 | 19 | 27 |
| 26 | 20 | 29 |
| 26 | 21 | 30 |
| 26 | 22 | 24 |
| 26 | 23 | 25 |
| 26 | 24 | 40 |
| 26 | 25 | 25 |
| 26 | 26 | 21 |

| Given Base Year Trip Matrix |             |              |
|-----------------------------|-------------|--------------|
| Origin                      | Destination | No. of Trips |



|   |    |      |
|---|----|------|
| 1 | 1  | 3413 |
| 1 | 2  | 126  |
| 1 | 3  | 231  |
| 1 | 4  | 384  |
| 1 | 5  | 91   |
| 1 | 6  | 231  |
| 1 | 7  | 301  |
| 1 | 8  | 0    |
| 1 | 9  | 0    |
| 1 | 10 | 45   |
| 1 | 11 | 114  |
| 1 | 12 | 45   |
| 1 | 13 | 174  |
| 1 | 14 | 23   |
| 1 | 15 | 57   |



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|   |    |    |
|---|----|----|
| 1 | 16 | 92 |
| 1 | 17 | 0  |
| 1 | 18 | 0  |
| 1 | 19 | 22 |
| 1 | 20 | 0  |
| 1 | 21 | 69 |
| 1 | 22 | 10 |
| 1 | 23 | 10 |
| 1 | 24 | 11 |
| 1 | 25 | 0  |
| 1 | 26 | 79 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 2      | 1           | 151          |
| 2      | 2           | 564          |



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|   |    |      |
|---|----|------|
| 2 | 3  | 729  |
| 2 | 4  | 507  |
| 2 | 5  | 188  |
| 2 | 6  | 586  |
| 2 | 7  | 1293 |
| 2 | 8  | 71   |
| 2 | 9  | 258  |
| 2 | 10 | 71   |
| 2 | 11 | 620  |
| 2 | 12 | 565  |
| 2 | 13 | 1263 |
| 2 | 14 | 118  |
| 2 | 15 | 163  |
| 2 | 16 | 188  |
| 2 | 17 | 0    |



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|   |    |     |
|---|----|-----|
| 2 | 18 | 23  |
| 2 | 19 | 47  |
| 2 | 20 | 0   |
| 2 | 21 | 318 |
| 2 | 22 | 22  |
| 2 | 23 | 224 |
| 2 | 24 | 0   |
| 2 | 25 | 0   |
| 2 | 26 | 143 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 3      | 1           | 435          |
| 3      | 2           | 289          |
| 3      | 3           | 1806         |
| 3      | 4           | 1207         |



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|   |    |      |
|---|----|------|
| 3 | 5  | 579  |
| 3 | 6  | 3639 |
| 3 | 7  | 2733 |
| 3 | 8  | 342  |
| 3 | 9  | 532  |
| 3 | 10 | 377  |
| 3 | 11 | 1168 |
| 3 | 12 | 1142 |
| 3 | 13 | 3200 |
| 3 | 14 | 297  |
| 3 | 15 | 1115 |
| 3 | 16 | 480  |
| 3 | 17 | 81   |
| 3 | 18 | 114  |
| 3 | 19 | 204  |





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|   |    |     |
|---|----|-----|
| 3 | 20 | 102 |
| 3 | 21 | 986 |
| 3 | 22 | 0   |
| 3 | 23 | 204 |
| 3 | 24 | 0   |
| 3 | 25 | 266 |
| 3 | 26 | 528 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 4      | 1           | 29           |
| 4      | 2           | 105          |
| 4      | 3           | 507          |
| 4      | 4           | 1030         |
| 4      | 5           | 188          |
| 4      | 6           | 1063         |



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|   |    |      |
|---|----|------|
| 4 | 7  | 922  |
| 4 | 8  | 58   |
| 4 | 9  | 69   |
| 4 | 10 | 70   |
| 4 | 11 | 402  |
| 4 | 12 | 726  |
| 4 | 13 | 1886 |
| 4 | 14 | 324  |
| 4 | 15 | 437  |
| 4 | 16 | 176  |
| 4 | 17 | 0    |
| 4 | 18 | 23   |
| 4 | 19 | 284  |
| 4 | 20 | 131  |
| 4 | 21 | 527  |



---

|   |    |     |
|---|----|-----|
| 4 | 22 | 23  |
| 4 | 23 | 139 |
| 4 | 24 | 94  |
| 4 | 25 | 23  |
| 4 | 26 | 103 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 5      | 1           | 106          |
| 5      | 2           | 170          |
| 5      | 3           | 370          |
| 5      | 4           | 984          |
| 5      | 5           | 2001         |
| 5      | 6           | 1784         |
| 5      | 7           | 1737         |
| 5      | 8           | 251          |



---

|   |    |      |
|---|----|------|
| 5 | 9  | 196  |
| 5 | 10 | 173  |
| 5 | 11 | 237  |
| 5 | 12 | 565  |
| 5 | 13 | 1561 |
| 5 | 14 | 303  |
| 5 | 15 | 374  |
| 5 | 16 | 210  |
| 5 | 17 | 15   |
| 5 | 18 | 86   |
| 5 | 19 | 51   |
| 5 | 20 | 89   |
| 5 | 21 | 513  |
| 5 | 22 | 2    |
| 5 | 23 | 203  |



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|   |    |     |
|---|----|-----|
| 5 | 24 | 0   |
| 5 | 25 | 112 |
| 5 | 26 | 60  |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 6      | 1           | 50           |
| 6      | 2           | 0            |
| 6      | 3           | 48           |
| 6      | 4           | 257          |
| 6      | 5           | 48           |
| 6      | 6           | 1940         |
| 6      | 7           | 454          |
| 6      | 8           | 144          |
| 6      | 9           | 118          |
| 6      | 10          | 25           |



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|   |    |      |
|---|----|------|
| 6 | 11 | 319  |
| 6 | 12 | 998  |
| 6 | 13 | 3683 |
| 6 | 14 | 290  |
| 6 | 15 | 702  |
| 6 | 16 | 187  |
| 6 | 17 | 0    |
| 6 | 18 | 48   |
| 6 | 19 | 370  |
| 6 | 20 | 150  |
| 6 | 21 | 1594 |
| 6 | 22 | 267  |
| 6 | 23 | 194  |
| 6 | 24 | 25   |
| 6 | 25 | 25   |



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|   |    |     |
|---|----|-----|
| 6 | 26 | 250 |
|---|----|-----|

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 7      | 1           | 147          |
| 7      | 2           | 46           |
| 7      | 3           | 420          |
| 7      | 4           | 237          |
| 7      | 5           | 302          |
| 7      | 6           | 1727         |
| 7      | 7           | 969          |
| 7      | 8           | 242          |
| 7      | 9           | 121          |
| 7      | 10          | 364          |
| 7      | 11          | 1182         |
| 7      | 12          | 1294         |



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|   |    |      |
|---|----|------|
| 7 | 13 | 1903 |
| 7 | 14 | 750  |
| 7 | 15 | 889  |
| 7 | 16 | 185  |
| 7 | 17 | 0    |
| 7 | 18 | 83   |
| 7 | 19 | 369  |
| 7 | 20 | 193  |
| 7 | 21 | 1499 |
| 7 | 22 | 135  |
| 7 | 23 | 282  |
| 7 | 24 | 24   |
| 7 | 25 | 49   |
| 7 | 26 | 229  |





| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 8      | 1           | 102          |
| 8      | 2           | 136          |
| 8      | 3           | 715          |
| 8      | 4           | 341          |
| 8      | 5           | 204          |
| 8      | 6           | 2577         |
| 8      | 7           | 1795         |
| 8      | 8           | 774          |
| 8      | 9           | 331          |
| 8      | 10          | 340          |
| 8      | 11          | 680          |
| 8      | 12          | 895          |
| 8      | 13          | 2334         |
| 8      | 14          | 272          |



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|   |    |      |
|---|----|------|
| 8 | 15 | 1013 |
| 8 | 16 | 613  |
| 8 | 17 | 0    |
| 8 | 18 | 34   |
| 8 | 19 | 238  |
| 8 | 20 | 238  |
| 8 | 21 | 1232 |
| 8 | 22 | 136  |
| 8 | 23 | 191  |
| 8 | 24 | 102  |
| 8 | 25 | 170  |
| 8 | 26 | 340  |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 9      | 1           | 0            |



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|   |    |      |
|---|----|------|
| 9 | 2  | 142  |
| 9 | 3  | 574  |
| 9 | 4  | 234  |
| 9 | 5  | 116  |
| 9 | 6  | 2001 |
| 9 | 7  | 2037 |
| 9 | 8  | 189  |
| 9 | 9  | 382  |
| 9 | 10 | 1073 |
| 9 | 11 | 1558 |
| 9 | 12 | 899  |
| 9 | 13 | 2396 |
| 9 | 14 | 678  |
| 9 | 15 | 997  |
| 9 | 16 | 835  |



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|   |    |      |
|---|----|------|
| 9 | 17 | 68   |
| 9 | 18 | 400  |
| 9 | 19 | 427  |
| 9 | 20 | 173  |
| 9 | 21 | 1194 |
| 9 | 22 | 159  |
| 9 | 23 | 213  |
| 9 | 24 | 71   |
| 9 | 25 | 213  |
| 9 | 26 | 607  |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 10     | 1           | 121          |
| 10     | 2           | 0            |
| 10     | 3           | 333          |



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|    |    |      |
|----|----|------|
| 10 | 4  | 89   |
| 10 | 5  | 162  |
| 10 | 6  | 1311 |
| 10 | 7  | 1624 |
| 10 | 8  | 116  |
| 10 | 9  | 293  |
| 10 | 10 | 1034 |
| 10 | 11 | 926  |
| 10 | 12 | 928  |
| 10 | 13 | 2741 |
| 10 | 14 | 498  |
| 10 | 15 | 1244 |
| 10 | 16 | 1377 |
| 10 | 17 | 58   |
| 10 | 18 | 118  |



---

|    |    |     |
|----|----|-----|
| 10 | 19 | 84  |
| 10 | 20 | 325 |
| 10 | 21 | 939 |
| 10 | 22 | 89  |
| 10 | 23 | 118 |
| 10 | 24 | 63  |
| 10 | 25 | 294 |
| 10 | 26 | 469 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 11     | 1           | 64           |
| 11     | 2           | 161          |
| 11     | 3           | 472          |
| 11     | 4           | 115          |
| 11     | 5           | 107          |



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|    |    |      |
|----|----|------|
| 11 | 6  | 1676 |
| 11 | 7  | 787  |
| 11 | 8  | 248  |
| 11 | 9  | 151  |
| 11 | 10 | 160  |
| 11 | 11 | 2521 |
| 11 | 12 | 1091 |
| 11 | 13 | 4171 |
| 11 | 14 | 788  |
| 11 | 15 | 774  |
| 11 | 16 | 868  |
| 11 | 17 | 25   |
| 11 | 18 | 96   |
| 11 | 19 | 403  |
| 11 | 20 | 302  |



|    |    |     |
|----|----|-----|
| 11 | 21 | 870 |
| 11 | 22 | 66  |
| 11 | 23 | 352 |
| 11 | 24 | 143 |
| 11 | 25 | 288 |
| 11 | 26 | 531 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 12     | 1           | 0            |
| 12     | 2           | 54           |
| 12     | 3           | 9            |
| 12     | 4           | 0            |
| 12     | 5           | 0            |
| 12     | 6           | 833          |
| 12     | 7           | 314          |





|    |    |      |
|----|----|------|
| 12 | 8  | 19   |
| 12 | 9  | 10   |
| 12 | 10 | 25   |
| 12 | 11 | 191  |
| 12 | 12 | 612  |
| 12 | 13 | 1725 |
| 12 | 14 | 439  |
| 12 | 15 | 200  |
| 12 | 16 | 71   |
| 12 | 17 | 0    |
| 12 | 18 | 15   |
| 12 | 19 | 173  |
| 12 | 20 | 184  |
| 12 | 21 | 623  |
| 12 | 22 | 25   |



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|    |    |     |
|----|----|-----|
| 12 | 23 | 55  |
| 12 | 24 | 9   |
| 12 | 25 | 62  |
| 12 | 26 | 181 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 13     | 1           | 0            |
| 13     | 2           | 73           |
| 13     | 3           | 35           |
| 13     | 4           | 49           |
| 13     | 5           | 0            |
| 13     | 6           | 784          |
| 13     | 7           | 215          |
| 13     | 8           | 107          |
| 13     | 9           | 78           |



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|    |    |      |
|----|----|------|
| 13 | 10 | 185  |
| 13 | 11 | 111  |
| 13 | 12 | 856  |
| 13 | 13 | 1224 |
| 13 | 14 | 284  |
| 13 | 15 | 281  |
| 13 | 16 | 108  |
| 13 | 17 | 15   |
| 13 | 18 | 0    |
| 13 | 19 | 47   |
| 13 | 20 | 101  |
| 13 | 21 | 482  |
| 13 | 22 | 33   |
| 13 | 23 | 89   |
| 13 | 24 | 0    |



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---

|    |    |     |
|----|----|-----|
| 13 | 25 | 68  |
| 13 | 26 | 134 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 14     | 1           | 16           |
| 14     | 2           | 0            |
| 14     | 3           | 52           |
| 14     | 4           | 36           |
| 14     | 5           | 88           |
| 14     | 6           | 638          |
| 14     | 7           | 264          |
| 14     | 8           | 77           |
| 14     | 9           | 23           |
| 14     | 10          | 100          |
| 14     | 11          | 374          |



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|    |    |      |
|----|----|------|
| 14 | 12 | 408  |
| 14 | 13 | 1538 |
| 14 | 14 | 593  |
| 14 | 15 | 385  |
| 14 | 16 | 90   |
| 14 | 17 | 44   |
| 14 | 18 | 0    |
| 14 | 19 | 360  |
| 14 | 20 | 146  |
| 14 | 21 | 471  |
| 14 | 22 | 59   |
| 14 | 23 | 151  |
| 14 | 24 | 37   |
| 14 | 25 | 81   |
| 14 | 26 | 190  |



| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 15     | 1           | 49           |
| 15     | 2           | 0            |
| 15     | 3           | 120          |
| 15     | 4           | 24           |
| 15     | 5           | 24           |
| 15     | 6           | 813          |
| 15     | 7           | 458          |
| 15     | 8           | 142          |
| 15     | 9           | 86           |
| 15     | 10          | 58           |
| 15     | 11          | 802          |
| 15     | 12          | 656          |
| 15     | 13          | 2228         |
| 15     | 14          | 1041         |



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|    |    |      |
|----|----|------|
| 15 | 15 | 1144 |
| 15 | 16 | 344  |
| 15 | 17 | 0    |
| 15 | 18 | 206  |
| 15 | 19 | 328  |
| 15 | 20 | 262  |
| 15 | 21 | 436  |
| 15 | 22 | 55   |
| 15 | 23 | 175  |
| 15 | 24 | 72   |
| 15 | 25 | 174  |
| 15 | 26 | 285  |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 16     | 1           | 50           |



|    |    |      |
|----|----|------|
| 16 | 2  | 50   |
| 16 | 3  | 173  |
| 16 | 4  | 176  |
| 16 | 5  | 50   |
| 16 | 6  | 815  |
| 16 | 7  | 596  |
| 16 | 8  | 93   |
| 16 | 9  | 76   |
| 16 | 10 | 499  |
| 16 | 11 | 980  |
| 16 | 12 | 714  |
| 16 | 13 | 1206 |
| 16 | 14 | 236  |
| 16 | 15 | 690  |
| 16 | 16 | 964  |





|    |    |     |
|----|----|-----|
| 16 | 17 | 77  |
| 16 | 18 | 114 |
| 16 | 19 | 159 |
| 16 | 20 | 164 |
| 16 | 21 | 603 |
| 16 | 22 | 110 |
| 16 | 23 | 50  |
| 16 | 24 | 151 |
| 16 | 25 | 91  |
| 16 | 26 | 255 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 17     | 1           | 61           |
| 17     | 2           | 15           |
| 17     | 3           | 677          |



|    |    |     |
|----|----|-----|
| 17 | 4  | 86  |
| 17 | 5  | 46  |
| 17 | 6  | 207 |
| 17 | 7  | 208 |
| 17 | 8  | 50  |
| 17 | 9  | 77  |
| 17 | 10 | 180 |
| 17 | 11 | 344 |
| 17 | 12 | 93  |
| 17 | 13 | 239 |
| 17 | 14 | 86  |
| 17 | 15 | 177 |
| 17 | 16 | 438 |
| 17 | 17 | 80  |
| 17 | 18 | 30  |



---

|    |    |     |
|----|----|-----|
| 17 | 19 | 24  |
| 17 | 20 | 0   |
| 17 | 21 | 303 |
| 17 | 22 | 9   |
| 17 | 23 | 78  |
| 17 | 24 | 18  |
| 17 | 25 | 0   |
| 17 | 26 | 43  |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 18     | 1           | 0            |
| 18     | 2           | 19           |
| 18     | 3           | 25           |
| 18     | 4           | 15           |
| 18     | 5           | 45           |



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|    |    |     |
|----|----|-----|
| 18 | 6  | 186 |
| 18 | 7  | 224 |
| 18 | 8  | 0   |
| 18 | 9  | 58  |
| 18 | 10 | 135 |
| 18 | 11 | 196 |
| 18 | 12 | 323 |
| 18 | 13 | 845 |
| 18 | 14 | 432 |
| 18 | 15 | 646 |
| 18 | 16 | 562 |
| 18 | 17 | 38  |
| 18 | 18 | 330 |
| 18 | 19 | 213 |
| 18 | 20 | 97  |



---

|    |    |     |
|----|----|-----|
| 18 | 21 | 351 |
| 18 | 22 | 19  |
| 18 | 23 | 106 |
| 18 | 24 | 38  |
| 18 | 25 | 71  |
| 18 | 26 | 219 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 19     | 1           | 49           |
| 19     | 2           | 33           |
| 19     | 3           | 101          |
| 19     | 4           | 16           |
| 19     | 5           | 17           |
| 19     | 6           | 437          |
| 19     | 7           | 296          |



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|    |    |      |
|----|----|------|
| 19 | 8  | 17   |
| 19 | 9  | 81   |
| 19 | 10 | 108  |
| 19 | 11 | 201  |
| 19 | 12 | 350  |
| 19 | 13 | 1300 |
| 19 | 14 | 498  |
| 19 | 15 | 792  |
| 19 | 16 | 227  |
| 19 | 17 | 34   |
| 19 | 18 | 183  |
| 19 | 19 | 521  |
| 19 | 20 | 283  |
| 19 | 21 | 177  |
| 19 | 22 | 34   |



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|    |    |     |
|----|----|-----|
| 19 | 23 | 135 |
| 19 | 24 | 62  |
| 19 | 25 | 124 |
| 19 | 26 | 98  |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 20     | 1           | 0            |
| 20     | 2           | 0            |
| 20     | 3           | 93           |
| 20     | 4           | 67           |
| 20     | 5           | 57           |
| 20     | 6           | 1494         |
| 20     | 7           | 523          |
| 20     | 8           | 0            |
| 20     | 9           | 0            |



|    |    |      |
|----|----|------|
| 20 | 10 | 247  |
| 20 | 11 | 531  |
| 20 | 12 | 980  |
| 20 | 13 | 2327 |
| 20 | 14 | 854  |
| 20 | 15 | 596  |
| 20 | 16 | 395  |
| 20 | 17 | 0    |
| 20 | 18 | 64   |
| 20 | 19 | 391  |
| 20 | 20 | 400  |
| 20 | 21 | 550  |
| 20 | 22 | 67   |
| 20 | 23 | 194  |
| 20 | 24 | 44   |





---

|    |    |     |
|----|----|-----|
| 20 | 25 | 0   |
| 20 | 26 | 531 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 21     | 1           | 121          |
| 21     | 2           | 0            |
| 21     | 3           | 25           |
| 21     | 4           | 48           |
| 21     | 5           | 23           |
| 21     | 6           | 1304         |
| 21     | 7           | 514          |
| 21     | 8           | 117          |
| 21     | 9           | 47           |
| 21     | 10          | 121          |
| 21     | 11          | 377          |



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|    |    |      |
|----|----|------|
| 21 | 12 | 1421 |
| 21 | 13 | 4354 |
| 21 | 14 | 424  |
| 21 | 15 | 365  |
| 21 | 16 | 221  |
| 21 | 17 | 9    |
| 21 | 18 | 60   |
| 21 | 19 | 113  |
| 21 | 20 | 104  |
| 21 | 21 | 1228 |
| 21 | 22 | 611  |
| 21 | 23 | 220  |
| 21 | 24 | 16   |
| 21 | 25 | 108  |
| 21 | 26 | 258  |



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| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 22     | 1           | 107          |
| 22     | 2           | 0            |
| 22     | 3           | 24           |
| 22     | 4           | 21           |
| 22     | 5           | 0            |
| 22     | 6           | 886          |
| 22     | 7           | 158          |
| 22     | 8           | 133          |
| 22     | 9           | 24           |
| 22     | 10          | 21           |
| 22     | 11          | 491          |
| 22     | 12          | 425          |
| 22     | 13          | 1653         |
| 22     | 14          | 346          |



|    |    |      |
|----|----|------|
| 22 | 15 | 273  |
| 22 | 16 | 173  |
| 22 | 17 | 46   |
| 22 | 18 | 23   |
| 22 | 19 | 159  |
| 22 | 20 | 140  |
| 22 | 21 | 1256 |
| 22 | 22 | 896  |
| 22 | 23 | 225  |
| 22 | 24 | 0    |
| 22 | 25 | 117  |
| 22 | 26 | 479  |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 23     | 1           | 134          |



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|    |    |      |
|----|----|------|
| 23 | 2  | 18   |
| 23 | 3  | 111  |
| 23 | 4  | 120  |
| 23 | 5  | 26   |
| 23 | 6  | 479  |
| 23 | 7  | 202  |
| 23 | 8  | 18   |
| 23 | 9  | 61   |
| 23 | 10 | 37   |
| 23 | 11 | 358  |
| 23 | 12 | 673  |
| 23 | 13 | 1744 |
| 23 | 14 | 335  |
| 23 | 15 | 226  |
| 23 | 16 | 80   |



|    |    |     |
|----|----|-----|
| 23 | 17 | 0   |
| 23 | 18 | 0   |
| 23 | 19 | 155 |
| 23 | 20 | 166 |
| 23 | 21 | 640 |
| 23 | 22 | 105 |
| 23 | 23 | 259 |
| 23 | 24 | 31  |
| 23 | 25 | 192 |
| 23 | 26 | 354 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 24     | 1           | 0            |
| 24     | 2           | 0            |
| 24     | 3           | 0            |



---

|    |    |     |
|----|----|-----|
| 24 | 4  | 0   |
| 24 | 5  | 0   |
| 24 | 6  | 161 |
| 24 | 7  | 186 |
| 24 | 8  | 67  |
| 24 | 9  | 22  |
| 24 | 10 | 78  |
| 24 | 11 | 344 |
| 24 | 12 | 49  |
| 24 | 13 | 258 |
| 24 | 14 | 285 |
| 24 | 15 | 229 |
| 24 | 16 | 168 |
| 24 | 17 | 0   |
| 24 | 18 | 97  |



|    |    |     |
|----|----|-----|
| 24 | 19 | 359 |
| 24 | 20 | 81  |
| 24 | 21 | 238 |
| 24 | 22 | 118 |
| 24 | 23 | 31  |
| 24 | 24 | 681 |
| 24 | 25 | 351 |
| 24 | 26 | 254 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 25     | 1           | 345          |
| 25     | 2           | 65           |
| 25     | 3           | 131          |
| 25     | 4           | 107          |
| 25     | 5           | 98           |





|    |    |      |
|----|----|------|
| 25 | 6  | 389  |
| 25 | 7  | 1869 |
| 25 | 8  | 32   |
| 25 | 9  | 65   |
| 25 | 10 | 368  |
| 25 | 11 | 986  |
| 25 | 12 | 772  |
| 25 | 13 | 1754 |
| 25 | 14 | 921  |
| 25 | 15 | 866  |
| 25 | 16 | 516  |
| 25 | 17 | 0    |
| 25 | 18 | 417  |
| 25 | 19 | 976  |
| 25 | 20 | 378  |



|    |    |      |
|----|----|------|
| 25 | 21 | 1000 |
| 25 | 22 | 468  |
| 25 | 23 | 639  |
| 25 | 24 | 616  |
| 25 | 25 | 2242 |
| 25 | 26 | 1245 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 26     | 1           | 32           |
| 26     | 2           | 0            |
| 26     | 3           | 0            |
| 26     | 4           | 10           |
| 26     | 5           | 32           |
| 26     | 6           | 144          |
| 26     | 7           | 159          |



|    |    |     |
|----|----|-----|
| 26 | 8  | 19  |
| 26 | 9  | 19  |
| 26 | 10 | 54  |
| 26 | 11 | 113 |
| 26 | 12 | 126 |
| 26 | 13 | 702 |
| 26 | 14 | 243 |
| 26 | 15 | 52  |
| 26 | 16 | 54  |
| 26 | 17 | 0   |
| 26 | 18 | 17  |
| 26 | 19 | 95  |
| 26 | 20 | 152 |
| 26 | 21 | 187 |
| 26 | 22 | 184 |



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|    |    |     |
|----|----|-----|
| 26 | 23 | 234 |
| 26 | 24 | 78  |
| 26 | 25 | 222 |
| 26 | 26 | 650 |

| Sum Totals of Origin |        | Sum Totals of Destination |        |
|----------------------|--------|---------------------------|--------|
| Origin               | Totals | Destination               | Totals |
| O1                   | 5528   | D1                        | 5582   |
| O2                   | 8112   | D2                        | 2066   |
| O3                   | 21826  | D3                        | 7781   |
| O4                   | 9339   | D4                        | 6160   |
| O5                   | 12153  | D5                        | 4492   |
| O6                   | 12186  | D6                        | 28105  |



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|     |       |     |       |
|-----|-------|-----|-------|
| O7  | 13641 | D7  | 20838 |
| O8  | 15803 | D8  | 3326  |
| O9  | 17636 | D9  | 3178  |
| O10 | 15354 | D10 | 5948  |
| O11 | 17230 | D11 | 16126 |
| O12 | 5829  | D12 | 17606 |
| O13 | 5359  | D13 | 48409 |
| O14 | 6221  | D14 | 11358 |
| O15 | 9982  | D15 | 14687 |
| O16 | 9142  | D16 | 9622  |
| O17 | 3569  | D17 | 590   |
| O18 | 5193  | D18 | 2581  |
| O19 | 6174  | D19 | 6572  |
| O20 | 10405 | D20 | 4361  |
| O21 | 12209 | D21 | 18286 |



|     |       |     |      |
|-----|-------|-----|------|
| O22 | 8076  | D22 | 3702 |
| O23 | 6524  | D23 | 4771 |
| O24 | 4057  | D24 | 2386 |
| O25 | 17265 | D25 | 5343 |
| O26 | 3578  | D26 | 8515 |

### Selected Frictional Functions : Exponential Function [ $F_{ij} = e^{-BC_{ij}}$ ]

Solution :

| Trip Matrix with respect to Optimal Beta Value (Minimum SSE) |             |              |
|--------------------------------------------------------------|-------------|--------------|
| Origin                                                       | Destination | No. of Trips |
| 1                                                            | 1           | 118          |
| 1                                                            | 2           | 44           |
| 1                                                            | 3           | 165          |



|   |    |      |
|---|----|------|
| 1 | 4  | 131  |
| 1 | 5  | 95   |
| 1 | 6  | 593  |
| 1 | 7  | 442  |
| 1 | 8  | 69   |
| 1 | 9  | 68   |
| 1 | 10 | 125  |
| 1 | 11 | 337  |
| 1 | 12 | 373  |
| 1 | 13 | 1016 |
| 1 | 14 | 237  |
| 1 | 15 | 310  |
| 1 | 16 | 203  |
| 1 | 17 | 12   |
| 1 | 18 | 54   |



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|   |    |     |
|---|----|-----|
| 1 | 19 | 133 |
| 1 | 20 | 90  |
| 1 | 21 | 386 |
| 1 | 22 | 77  |
| 1 | 23 | 99  |
| 1 | 24 | 49  |
| 1 | 25 | 111 |
| 1 | 26 | 178 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 2      | 1           | 173          |
| 2      | 2           | 64           |
| 2      | 3           | 242          |
| 2      | 4           | 192          |
| 2      | 5           | 138          |





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|   |    |      |
|---|----|------|
| 2 | 6  | 870  |
| 2 | 7  | 649  |
| 2 | 8  | 102  |
| 2 | 9  | 98   |
| 2 | 10 | 184  |
| 2 | 11 | 499  |
| 2 | 12 | 538  |
| 2 | 13 | 1503 |
| 2 | 14 | 347  |
| 2 | 15 | 455  |
| 2 | 16 | 302  |
| 2 | 17 | 17   |
| 2 | 18 | 79   |
| 2 | 19 | 203  |
| 2 | 20 | 133  |



|   |    |     |
|---|----|-----|
| 2 | 21 | 560 |
| 2 | 22 | 114 |
| 2 | 23 | 145 |
| 2 | 24 | 72  |
| 2 | 25 | 160 |
| 2 | 26 | 261 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 3      | 1           | 465          |
| 3      | 2           | 172          |
| 3      | 3           | 656          |
| 3      | 4           | 517          |
| 3      | 5           | 375          |
| 3      | 6           | 2349         |
| 3      | 7           | 1750         |



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|   |    |      |
|---|----|------|
| 3 | 8  | 278  |
| 3 | 9  | 267  |
| 3 | 10 | 497  |
| 3 | 11 | 1346 |
| 3 | 12 | 1466 |
| 3 | 13 | 4002 |
| 3 | 14 | 942  |
| 3 | 15 | 1221 |
| 3 | 16 | 802  |
| 3 | 17 | 49   |
| 3 | 18 | 215  |
| 3 | 19 | 545  |
| 3 | 20 | 360  |
| 3 | 21 | 1505 |
| 3 | 22 | 306  |



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|   |    |     |
|---|----|-----|
| 3 | 23 | 392 |
| 3 | 24 | 197 |
| 3 | 25 | 439 |
| 3 | 26 | 699 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 4      | 1           | 199          |
| 4      | 2           | 74           |
| 4      | 3           | 279          |
| 4      | 4           | 222          |
| 4      | 5           | 161          |
| 4      | 6           | 1005         |
| 4      | 7           | 749          |
| 4      | 8           | 119          |
| 4      | 9           | 113          |



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|   |    |      |
|---|----|------|
| 4 | 10 | 212  |
| 4 | 11 | 576  |
| 4 | 12 | 626  |
| 4 | 13 | 1717 |
| 4 | 14 | 403  |
| 4 | 15 | 523  |
| 4 | 16 | 339  |
| 4 | 17 | 20   |
| 4 | 18 | 91   |
| 4 | 19 | 232  |
| 4 | 20 | 155  |
| 4 | 21 | 648  |
| 4 | 22 | 131  |
| 4 | 23 | 167  |
| 4 | 24 | 82   |



---

|   |    |     |
|---|----|-----|
| 4 | 25 | 184 |
| 4 | 26 | 297 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 5      | 1           | 258          |
| 5      | 2           | 95           |
| 5      | 3           | 361          |
| 5      | 4           | 289          |
| 5      | 5           | 211          |
| 5      | 6           | 1309         |
| 5      | 7           | 974          |
| 5      | 8           | 155          |
| 5      | 9           | 148          |
| 5      | 10          | 275          |
| 5      | 11          | 752          |



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|   |    |      |
|---|----|------|
| 5 | 12 | 817  |
| 5 | 13 | 2237 |
| 5 | 14 | 526  |
| 5 | 15 | 684  |
| 5 | 16 | 443  |
| 5 | 17 | 27   |
| 5 | 18 | 117  |
| 5 | 19 | 303  |
| 5 | 20 | 199  |
| 5 | 21 | 831  |
| 5 | 22 | 170  |
| 5 | 23 | 220  |
| 5 | 24 | 109  |
| 5 | 25 | 243  |
| 5 | 26 | 388  |



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| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 6      | 1           | 255          |
| 6      | 2           | 95           |
| 6      | 3           | 360          |
| 6      | 4           | 285          |
| 6      | 5           | 207          |
| 6      | 6           | 1314         |
| 6      | 7           | 969          |
| 6      | 8           | 153          |
| 6      | 9           | 146          |
| 6      | 10          | 276          |
| 6      | 11          | 750          |
| 6      | 12          | 822          |
| 6      | 13          | 2257         |
| 6      | 14          | 527          |





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|   |    |     |
|---|----|-----|
| 6 | 15 | 680 |
| 6 | 16 | 447 |
| 6 | 17 | 27  |
| 6 | 18 | 119 |
| 6 | 19 | 303 |
| 6 | 20 | 201 |
| 6 | 21 | 851 |
| 6 | 22 | 170 |
| 6 | 23 | 220 |
| 6 | 24 | 108 |
| 6 | 25 | 242 |
| 6 | 26 | 389 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 7      | 1           | 289          |



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|   |    |      |
|---|----|------|
| 7 | 2  | 106  |
| 7 | 3  | 404  |
| 7 | 4  | 320  |
| 7 | 5  | 233  |
| 7 | 6  | 1468 |
| 7 | 7  | 1092 |
| 7 | 8  | 172  |
| 7 | 9  | 165  |
| 7 | 10 | 310  |
| 7 | 11 | 841  |
| 7 | 12 | 919  |
| 7 | 13 | 2514 |
| 7 | 14 | 591  |
| 7 | 15 | 762  |
| 7 | 16 | 497  |



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|   |    |     |
|---|----|-----|
| 7 | 17 | 30  |
| 7 | 18 | 133 |
| 7 | 19 | 339 |
| 7 | 20 | 225 |
| 7 | 21 | 946 |
| 7 | 22 | 189 |
| 7 | 23 | 247 |
| 7 | 24 | 122 |
| 7 | 25 | 274 |
| 7 | 26 | 438 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 8      | 1           | 334          |
| 8      | 2           | 124          |
| 8      | 3           | 473          |



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|   |    |      |
|---|----|------|
| 8 | 4  | 375  |
| 8 | 5  | 271  |
| 8 | 6  | 1699 |
| 8 | 7  | 1267 |
| 8 | 8  | 202  |
| 8 | 9  | 193  |
| 8 | 10 | 363  |
| 8 | 11 | 978  |
| 8 | 12 | 1059 |
| 8 | 13 | 2906 |
| 8 | 14 | 681  |
| 8 | 15 | 886  |
| 8 | 16 | 584  |
| 8 | 17 | 35   |
| 8 | 18 | 154  |



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|   |    |      |
|---|----|------|
| 8 | 19 | 389  |
| 8 | 20 | 258  |
| 8 | 21 | 1094 |
| 8 | 22 | 221  |
| 8 | 23 | 281  |
| 8 | 24 | 141  |
| 8 | 25 | 317  |
| 8 | 26 | 507  |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 9      | 1           | 378          |
| 9      | 2           | 138          |
| 9      | 3           | 528          |
| 9      | 4           | 417          |
| 9      | 5           | 299          |



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|   |    |      |
|---|----|------|
| 9 | 6  | 1895 |
| 9 | 7  | 1412 |
| 9 | 8  | 225  |
| 9 | 9  | 216  |
| 9 | 10 | 404  |
| 9 | 11 | 1092 |
| 9 | 12 | 1183 |
| 9 | 13 | 3235 |
| 9 | 14 | 762  |
| 9 | 15 | 989  |
| 9 | 16 | 651  |
| 9 | 17 | 39   |
| 9 | 18 | 174  |
| 9 | 19 | 438  |
| 9 | 20 | 292  |



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|   |    |      |
|---|----|------|
| 9 | 21 | 1217 |
| 9 | 22 | 244  |
| 9 | 23 | 317  |
| 9 | 24 | 159  |
| 9 | 25 | 354  |
| 9 | 26 | 563  |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 10     | 1           | 323          |
| 10     | 2           | 121          |
| 10     | 3           | 455          |
| 10     | 4           | 361          |
| 10     | 5           | 260          |
| 10     | 6           | 1653         |
| 10     | 7           | 1232         |



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|    |    |      |
|----|----|------|
| 10 | 8  | 195  |
| 10 | 9  | 187  |
| 10 | 10 | 351  |
| 10 | 11 | 950  |
| 10 | 12 | 1036 |
| 10 | 13 | 2823 |
| 10 | 14 | 659  |
| 10 | 15 | 862  |
| 10 | 16 | 566  |
| 10 | 17 | 34   |
| 10 | 18 | 151  |
| 10 | 19 | 382  |
| 10 | 20 | 253  |
| 10 | 21 | 1063 |
| 10 | 22 | 213  |





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|    |    |     |
|----|----|-----|
| 10 | 23 | 276 |
| 10 | 24 | 137 |
| 10 | 25 | 309 |
| 10 | 26 | 489 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 11     | 1           | 358          |
| 11     | 2           | 132          |
| 11     | 3           | 509          |
| 11     | 4           | 402          |
| 11     | 5           | 293          |
| 11     | 6           | 1852         |
| 11     | 7           | 1372         |
| 11     | 8           | 218          |
| 11     | 9           | 208          |



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|    |    |      |
|----|----|------|
| 11 | 10 | 392  |
| 11 | 11 | 1066 |
| 11 | 12 | 1160 |
| 11 | 13 | 3184 |
| 11 | 14 | 747  |
| 11 | 15 | 965  |
| 11 | 16 | 634  |
| 11 | 17 | 38   |
| 11 | 18 | 168  |
| 11 | 19 | 430  |
| 11 | 20 | 285  |
| 11 | 21 | 1197 |
| 11 | 22 | 240  |
| 11 | 23 | 311  |
| 11 | 24 | 155  |



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|    |    |     |
|----|----|-----|
| 11 | 25 | 347 |
| 11 | 26 | 555 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 12     | 1           | 122          |
| 12     | 2           | 45           |
| 12     | 3           | 171          |
| 12     | 4           | 135          |
| 12     | 5           | 99           |
| 12     | 6           | 626          |
| 12     | 7           | 462          |
| 12     | 8           | 73           |
| 12     | 9           | 69           |
| 12     | 10          | 131          |
| 12     | 11          | 358          |



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|    |    |      |
|----|----|------|
| 12 | 12 | 394  |
| 12 | 13 | 1081 |
| 12 | 14 | 253  |
| 12 | 15 | 326  |
| 12 | 16 | 212  |
| 12 | 17 | 12   |
| 12 | 18 | 57   |
| 12 | 19 | 145  |
| 12 | 20 | 96   |
| 12 | 21 | 407  |
| 12 | 22 | 82   |
| 12 | 23 | 105  |
| 12 | 24 | 52   |
| 12 | 25 | 117  |
| 12 | 26 | 188  |



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| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 13     | 1           | 111          |
| 13     | 2           | 41           |
| 13     | 3           | 156          |
| 13     | 4           | 124          |
| 13     | 5           | 90           |
| 13     | 6           | 576          |
| 13     | 7           | 424          |
| 13     | 8           | 67           |
| 13     | 9           | 64           |
| 13     | 10          | 120          |
| 13     | 11          | 329          |
| 13     | 12          | 361          |
| 13     | 13          | 997          |
| 13     | 14          | 233          |



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|    |    |     |
|----|----|-----|
| 13 | 15 | 299 |
| 13 | 16 | 195 |
| 13 | 17 | 11  |
| 13 | 18 | 52  |
| 13 | 19 | 133 |
| 13 | 20 | 89  |
| 13 | 21 | 375 |
| 13 | 22 | 75  |
| 13 | 23 | 97  |
| 13 | 24 | 48  |
| 13 | 25 | 107 |
| 13 | 26 | 172 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 14     | 1           | 129          |



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|    |    |      |
|----|----|------|
| 14 | 2  | 48   |
| 14 | 3  | 181  |
| 14 | 4  | 144  |
| 14 | 5  | 104  |
| 14 | 6  | 666  |
| 14 | 7  | 493  |
| 14 | 8  | 78   |
| 14 | 9  | 74   |
| 14 | 10 | 140  |
| 14 | 11 | 382  |
| 14 | 12 | 420  |
| 14 | 13 | 1154 |
| 14 | 14 | 271  |
| 14 | 15 | 350  |
| 14 | 16 | 228  |



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|    |    |     |
|----|----|-----|
| 14 | 17 | 13  |
| 14 | 18 | 60  |
| 14 | 19 | 156 |
| 14 | 20 | 103 |
| 14 | 21 | 434 |
| 14 | 22 | 87  |
| 14 | 23 | 113 |
| 14 | 24 | 56  |
| 14 | 25 | 125 |
| 14 | 26 | 200 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 15     | 1           | 208          |
| 15     | 2           | 76           |
| 15     | 3           | 294          |





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|    |    |      |
|----|----|------|
| 15 | 4  | 232  |
| 15 | 5  | 168  |
| 15 | 6  | 1067 |
| 15 | 7  | 792  |
| 15 | 8  | 126  |
| 15 | 9  | 120  |
| 15 | 10 | 226  |
| 15 | 11 | 616  |
| 15 | 12 | 673  |
| 15 | 13 | 1841 |
| 15 | 14 | 435  |
| 15 | 15 | 563  |
| 15 | 16 | 367  |
| 15 | 17 | 22   |
| 15 | 18 | 98   |



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|    |    |     |
|----|----|-----|
| 15 | 19 | 250 |
| 15 | 20 | 166 |
| 15 | 21 | 696 |
| 15 | 22 | 140 |
| 15 | 23 | 182 |
| 15 | 24 | 90  |
| 15 | 25 | 202 |
| 15 | 26 | 320 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 16     | 1           | 193          |
| 16     | 2           | 71           |
| 16     | 3           | 270          |
| 16     | 4           | 212          |
| 16     | 5           | 154          |



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|    |    |      |
|----|----|------|
| 16 | 6  | 981  |
| 16 | 7  | 729  |
| 16 | 8  | 115  |
| 16 | 9  | 110  |
| 16 | 10 | 208  |
| 16 | 11 | 560  |
| 16 | 12 | 612  |
| 16 | 13 | 1690 |
| 16 | 14 | 396  |
| 16 | 15 | 514  |
| 16 | 16 | 336  |
| 16 | 17 | 20   |
| 16 | 18 | 90   |
| 16 | 19 | 228  |
| 16 | 20 | 151  |



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|    |    |     |
|----|----|-----|
| 16 | 21 | 635 |
| 16 | 22 | 127 |
| 16 | 23 | 165 |
| 16 | 24 | 82  |
| 16 | 25 | 184 |
| 16 | 26 | 294 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 17     | 1           | 76           |
| 17     | 2           | 28           |
| 17     | 3           | 107          |
| 17     | 4           | 84           |
| 17     | 5           | 60           |
| 17     | 6           | 381          |
| 17     | 7           | 282          |



|    |    |     |
|----|----|-----|
| 17 | 8  | 45  |
| 17 | 9  | 43  |
| 17 | 10 | 81  |
| 17 | 11 | 221 |
| 17 | 12 | 240 |
| 17 | 13 | 656 |
| 17 | 14 | 155 |
| 17 | 15 | 202 |
| 17 | 16 | 132 |
| 17 | 17 | 8   |
| 17 | 18 | 35  |
| 17 | 19 | 90  |
| 17 | 20 | 58  |
| 17 | 21 | 246 |
| 17 | 22 | 49  |



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|    |    |     |
|----|----|-----|
| 17 | 23 | 64  |
| 17 | 24 | 32  |
| 17 | 25 | 69  |
| 17 | 26 | 113 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 18     | 1           | 109          |
| 18     | 2           | 39           |
| 18     | 3           | 154          |
| 18     | 4           | 121          |
| 18     | 5           | 88           |
| 18     | 6           | 546          |
| 18     | 7           | 414          |
| 18     | 8           | 65           |
| 18     | 9           | 63           |



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|    |    |     |
|----|----|-----|
| 18 | 10 | 118 |
| 18 | 11 | 321 |
| 18 | 12 | 350 |
| 18 | 13 | 959 |
| 18 | 14 | 225 |
| 18 | 15 | 292 |
| 18 | 16 | 192 |
| 18 | 17 | 11  |
| 18 | 18 | 51  |
| 18 | 19 | 130 |
| 18 | 20 | 86  |
| 18 | 21 | 361 |
| 18 | 22 | 72  |
| 18 | 23 | 94  |
| 18 | 24 | 47  |



---

|    |    |     |
|----|----|-----|
| 18 | 25 | 105 |
| 18 | 26 | 167 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 19     | 1           | 130          |
| 19     | 2           | 48           |
| 19     | 3           | 182          |
| 19     | 4           | 143          |
| 19     | 5           | 105          |
| 19     | 6           | 658          |
| 19     | 7           | 489          |
| 19     | 8           | 76           |
| 19     | 9           | 74           |
| 19     | 10          | 138          |
| 19     | 11          | 380          |





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|    |    |      |
|----|----|------|
| 19 | 12 | 416  |
| 19 | 13 | 1135 |
| 19 | 14 | 270  |
| 19 | 15 | 347  |
| 19 | 16 | 227  |
| 19 | 17 | 13   |
| 19 | 18 | 60   |
| 19 | 19 | 156  |
| 19 | 20 | 102  |
| 19 | 21 | 432  |
| 19 | 22 | 87   |
| 19 | 23 | 112  |
| 19 | 24 | 55   |
| 19 | 25 | 125  |
| 19 | 26 | 200  |



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| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 20     | 1           | 216          |
| 20     | 2           | 79           |
| 20     | 3           | 304          |
| 20     | 4           | 242          |
| 20     | 5           | 173          |
| 20     | 6           | 1113         |
| 20     | 7           | 825          |
| 20     | 8           | 129          |
| 20     | 9           | 124          |
| 20     | 10          | 234          |
| 20     | 11          | 640          |
| 20     | 12          | 701          |
| 20     | 13          | 1928         |
| 20     | 14          | 455          |



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|    |    |     |
|----|----|-----|
| 20 | 15 | 585 |
| 20 | 16 | 380 |
| 20 | 17 | 22  |
| 20 | 18 | 102 |
| 20 | 19 | 260 |
| 20 | 20 | 173 |
| 20 | 21 | 728 |
| 20 | 22 | 146 |
| 20 | 23 | 190 |
| 20 | 24 | 94  |
| 20 | 25 | 210 |
| 20 | 26 | 337 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 21     | 1           | 256          |



|    |    |      |
|----|----|------|
| 21 | 2  | 94   |
| 21 | 3  | 355  |
| 21 | 4  | 282  |
| 21 | 5  | 205  |
| 21 | 6  | 1310 |
| 21 | 7  | 966  |
| 21 | 8  | 152  |
| 21 | 9  | 145  |
| 21 | 10 | 274  |
| 21 | 11 | 749  |
| 21 | 12 | 823  |
| 21 | 13 | 2272 |
| 21 | 14 | 531  |
| 21 | 15 | 683  |
| 21 | 16 | 445  |



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|    |    |     |
|----|----|-----|
| 21 | 17 | 26  |
| 21 | 18 | 119 |
| 21 | 19 | 305 |
| 21 | 20 | 203 |
| 21 | 21 | 857 |
| 21 | 22 | 173 |
| 21 | 23 | 222 |
| 21 | 24 | 109 |
| 21 | 25 | 245 |
| 21 | 26 | 396 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 22     | 1           | 171          |
| 22     | 2           | 62           |
| 22     | 3           | 236          |



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|    |    |      |
|----|----|------|
| 22 | 4  | 188  |
| 22 | 5  | 136  |
| 22 | 6  | 866  |
| 22 | 7  | 638  |
| 22 | 8  | 101  |
| 22 | 9  | 95   |
| 22 | 10 | 176  |
| 22 | 11 | 492  |
| 22 | 12 | 543  |
| 22 | 13 | 1503 |
| 22 | 14 | 349  |
| 22 | 15 | 451  |
| 22 | 16 | 294  |
| 22 | 17 | 17   |
| 22 | 18 | 77   |



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|    |    |     |
|----|----|-----|
| 22 | 19 | 202 |
| 22 | 20 | 134 |
| 22 | 21 | 568 |
| 22 | 22 | 115 |
| 22 | 23 | 147 |
| 22 | 24 | 73  |
| 22 | 25 | 164 |
| 22 | 26 | 262 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 23     | 1           | 137          |
| 23     | 2           | 50           |
| 23     | 3           | 191          |
| 23     | 4           | 150          |
| 23     | 5           | 109          |



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|    |    |      |
|----|----|------|
| 23 | 6  | 699  |
| 23 | 7  | 517  |
| 23 | 8  | 81   |
| 23 | 9  | 77   |
| 23 | 10 | 146  |
| 23 | 11 | 400  |
| 23 | 12 | 439  |
| 23 | 13 | 1205 |
| 23 | 14 | 285  |
| 23 | 15 | 366  |
| 23 | 16 | 238  |
| 23 | 17 | 14   |
| 23 | 18 | 63   |
| 23 | 19 | 163  |
| 23 | 20 | 109  |





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|    |    |     |
|----|----|-----|
| 23 | 21 | 457 |
| 23 | 22 | 92  |
| 23 | 23 | 120 |
| 23 | 24 | 59  |
| 23 | 25 | 133 |
| 23 | 26 | 213 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 24     | 1           | 85           |
| 24     | 2           | 31           |
| 24     | 3           | 118          |
| 24     | 4           | 95           |
| 24     | 5           | 66           |
| 24     | 6           | 433          |
| 24     | 7           | 323          |



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|    |    |     |
|----|----|-----|
| 24 | 8  | 50  |
| 24 | 9  | 49  |
| 24 | 10 | 91  |
| 24 | 11 | 250 |
| 24 | 12 | 273 |
| 24 | 13 | 746 |
| 24 | 14 | 177 |
| 24 | 15 | 229 |
| 24 | 16 | 148 |
| 24 | 17 | 8   |
| 24 | 18 | 40  |
| 24 | 19 | 101 |
| 24 | 20 | 68  |
| 24 | 21 | 281 |
| 24 | 22 | 57  |



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|    |    |     |
|----|----|-----|
| 24 | 23 | 74  |
| 24 | 24 | 37  |
| 24 | 25 | 83  |
| 24 | 26 | 132 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 25     | 1           | 365          |
| 25     | 2           | 130          |
| 25     | 3           | 506          |
| 25     | 4           | 397          |
| 25     | 5           | 291          |
| 25     | 6           | 1834         |
| 25     | 7           | 1373         |
| 25     | 8           | 216          |
| 25     | 9           | 206          |



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|    |    |      |
|----|----|------|
| 25 | 10 | 390  |
| 25 | 11 | 1065 |
| 25 | 12 | 1160 |
| 25 | 13 | 3188 |
| 25 | 14 | 752  |
| 25 | 15 | 972  |
| 25 | 16 | 632  |
| 25 | 17 | 38   |
| 25 | 18 | 169  |
| 25 | 19 | 435  |
| 25 | 20 | 289  |
| 25 | 21 | 1199 |
| 25 | 22 | 245  |
| 25 | 23 | 316  |
| 25 | 24 | 158  |



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|    |    |     |
|----|----|-----|
| 25 | 25 | 356 |
| 25 | 26 | 568 |

| Origin | Destination | No. of Trips |
|--------|-------------|--------------|
| 26     | 1           | 73           |
| 26     | 2           | 27           |
| 26     | 3           | 104          |
| 26     | 4           | 82           |
| 26     | 5           | 59           |
| 26     | 6           | 384          |
| 26     | 7           | 283          |
| 26     | 8           | 44           |
| 26     | 9           | 42           |
| 26     | 10          | 80           |
| 26     | 11          | 220          |



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|    |    |     |
|----|----|-----|
| 26 | 12 | 241 |
| 26 | 13 | 661 |
| 26 | 14 | 156 |
| 26 | 15 | 199 |
| 26 | 16 | 130 |
| 26 | 17 | 7   |
| 26 | 18 | 35  |
| 26 | 19 | 90  |
| 26 | 20 | 59  |
| 26 | 21 | 250 |
| 26 | 22 | 51  |
| 26 | 23 | 65  |
| 26 | 24 | 32  |
| 26 | 25 | 73  |
| 26 | 26 | 117 |



Minimum Residual = 47437919.096686

Optimal Beta = 0.001

| Target Oi | Modelled Oi | Target Dj | Modelled Dj     |
|-----------|-------------|-----------|-----------------|
| 5528      | 5528        | 5582      | 5545.9093483239 |
| 8112      | 8112        | 2066      | 2045.9199099436 |
| 21826     | 21826       | 7781      | 7774.9263704269 |
| 9339      | 9339        | 6160      | 6155.2725686639 |
| 12153     | 12153       | 4492      | 4463.099373828  |
| 12186     | 12186       | 28105     | 28160.232156519 |
| 13641     | 13641       | 20838     | 20929.890565158 |
| 15803     | 15803       | 3326      | 3318.1366027454 |
| 17636     | 17636       | 3178      | 3177.2865841495 |
| 15354     | 15354       | 5948      | 5953.0419599945 |
| 17230     | 17230       | 16126     | 16183.155324675 |
| 5829      | 5829        | 17606     | 17656.434931706 |



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|       |       |       |                 |
|-------|-------|-------|-----------------|
| 5359  | 5359  | 48409 | 48422.163700178 |
| 6221  | 6221  | 11358 | 11380.589550461 |
| 9982  | 9982  | 14687 | 14726.959304365 |
| 9142  | 9142  | 9622  | 9635.7428792956 |
| 3569  | 3569  | 590   | 584.78574305634 |
| 5193  | 5193  | 2581  | 2575.5963386413 |
| 6174  | 6174  | 6572  | 6553.6752481334 |
| 10405 | 10405 | 4361  | 4352.5294826386 |
| 12209 | 12209 | 18286 | 18235.789566867 |
| 8076  | 8076  | 3702  | 3688.6750373262 |
| 6524  | 6524  | 4771  | 4755.0356863861 |
| 4057  | 4057  | 2386  | 2366.7149704149 |
| 17265 | 17265 | 5343  | 5292.1682039785 |
| 3578  | 3578  | 8515  | 8457.2685921237 |





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| Beta  | Residual SSE    |
|-------|-----------------|
| 0.001 | 47437919.096686 |
| 0.002 | 47437919.096686 |
| 0.003 | 47437919.096686 |
| 0.004 | 47437919.096686 |
| 0.005 | 47437919.096686 |
| 0.006 | 47437919.096686 |
| 0.007 | 47437919.096686 |
| 0.008 | 47437919.096686 |
| 0.009 | 47437919.096686 |
| 0.01  | 47437919.096686 |
| 0.011 | 47437919.096686 |
| 0.012 | 47437919.096686 |
| 0.013 | 47437919.096686 |
| 0.014 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.015 | 47437919.096686 |
| 0.016 | 47437919.096686 |
| 0.017 | 47437919.096686 |
| 0.018 | 47437919.096686 |
| 0.019 | 47437919.096686 |
| 0.02  | 47437919.096686 |
| 0.021 | 47437919.096686 |
| 0.022 | 47437919.096686 |
| 0.023 | 47437919.096686 |
| 0.024 | 47437919.096686 |
| 0.025 | 47437919.096686 |
| 0.026 | 47437919.096686 |
| 0.027 | 47437919.096686 |
| 0.028 | 47437919.096686 |
| 0.029 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.03  | 47437919.096686 |
| 0.031 | 47437919.096686 |
| 0.032 | 47437919.096686 |
| 0.033 | 47437919.096686 |
| 0.034 | 47437919.096686 |
| 0.035 | 47437919.096686 |
| 0.036 | 47437919.096686 |
| 0.037 | 47437919.096686 |
| 0.038 | 47437919.096686 |
| 0.039 | 47437919.096686 |
| 0.04  | 47437919.096686 |
| 0.041 | 47437919.096686 |
| 0.042 | 47437919.096686 |
| 0.043 | 47437919.096686 |
| 0.044 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.045 | 47437919.096686 |
| 0.046 | 47437919.096686 |
| 0.047 | 47437919.096686 |
| 0.048 | 47437919.096686 |
| 0.049 | 47437919.096686 |
| 0.05  | 47437919.096686 |
| 0.051 | 47437919.096686 |
| 0.052 | 47437919.096686 |
| 0.053 | 47437919.096686 |
| 0.054 | 47437919.096686 |
| 0.055 | 47437919.096686 |
| 0.056 | 47437919.096686 |
| 0.057 | 47437919.096686 |
| 0.058 | 47437919.096686 |
| 0.059 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.06  | 47437919.096686 |
| 0.061 | 47437919.096686 |
| 0.062 | 47437919.096686 |
| 0.063 | 47437919.096686 |
| 0.064 | 47437919.096686 |
| 0.065 | 47437919.096686 |
| 0.066 | 47437919.096686 |
| 0.067 | 47437919.096686 |
| 0.068 | 47437919.096686 |
| 0.069 | 47437919.096686 |
| 0.07  | 47437919.096686 |
| 0.071 | 47437919.096686 |
| 0.072 | 47437919.096686 |
| 0.073 | 47437919.096686 |
| 0.074 | 47437919.096686 |



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|       |                 |
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| 0.075 | 47437919.096686 |
| 0.076 | 47437919.096686 |
| 0.077 | 47437919.096686 |
| 0.078 | 47437919.096686 |
| 0.079 | 47437919.096686 |
| 0.08  | 47437919.096686 |
| 0.081 | 47437919.096686 |
| 0.082 | 47437919.096686 |
| 0.083 | 47437919.096686 |
| 0.084 | 47437919.096686 |
| 0.085 | 47437919.096686 |
| 0.086 | 47437919.096686 |
| 0.087 | 47437919.096686 |
| 0.088 | 47437919.096686 |
| 0.089 | 47437919.096686 |



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| 0.09  | 47437919.096686 |
| 0.091 | 47437919.096686 |
| 0.092 | 47437919.096686 |
| 0.093 | 47437919.096686 |
| 0.094 | 47437919.096686 |
| 0.095 | 47437919.096686 |
| 0.096 | 47437919.096686 |
| 0.097 | 47437919.096686 |
| 0.098 | 47437919.096686 |
| 0.099 | 47437919.096686 |
| 0.1   | 47437919.096686 |
| 0.101 | 47437919.096686 |
| 0.102 | 47437919.096686 |
| 0.103 | 47437919.096686 |
| 0.104 | 47437919.096686 |



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|       |                 |
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| 0.105 | 47437919.096686 |
| 0.106 | 47437919.096686 |
| 0.107 | 47437919.096686 |
| 0.108 | 47437919.096686 |
| 0.109 | 47437919.096686 |
| 0.11  | 47437919.096686 |
| 0.111 | 47437919.096686 |
| 0.112 | 47437919.096686 |
| 0.113 | 47437919.096686 |
| 0.114 | 47437919.096686 |
| 0.115 | 47437919.096686 |
| 0.116 | 47437919.096686 |
| 0.117 | 47437919.096686 |
| 0.118 | 47437919.096686 |
| 0.119 | 47437919.096686 |





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| 0.12  | 47437919.096686 |
| 0.121 | 47437919.096686 |
| 0.122 | 47437919.096686 |
| 0.123 | 47437919.096686 |
| 0.124 | 47437919.096686 |
| 0.125 | 47437919.096686 |
| 0.126 | 47437919.096686 |
| 0.127 | 47437919.096686 |
| 0.128 | 47437919.096686 |
| 0.129 | 47437919.096686 |
| 0.13  | 47437919.096686 |
| 0.131 | 47437919.096686 |
| 0.132 | 47437919.096686 |
| 0.133 | 47437919.096686 |
| 0.134 | 47437919.096686 |



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| 0.135 | 47437919.096686 |
| 0.136 | 47437919.096686 |
| 0.137 | 47437919.096686 |
| 0.138 | 47437919.096686 |
| 0.139 | 47437919.096686 |
| 0.14  | 47437919.096686 |
| 0.141 | 47437919.096686 |
| 0.142 | 47437919.096686 |
| 0.143 | 47437919.096686 |
| 0.144 | 47437919.096686 |
| 0.145 | 47437919.096686 |
| 0.146 | 47437919.096686 |
| 0.147 | 47437919.096686 |
| 0.148 | 47437919.096686 |
| 0.149 | 47437919.096686 |



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| 0.15  | 47437919.096686 |
| 0.151 | 47437919.096686 |
| 0.152 | 47437919.096686 |
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| 0.154 | 47437919.096686 |
| 0.155 | 47437919.096686 |
| 0.156 | 47437919.096686 |
| 0.157 | 47437919.096686 |
| 0.158 | 47437919.096686 |
| 0.159 | 47437919.096686 |
| 0.16  | 47437919.096686 |
| 0.161 | 47437919.096686 |
| 0.162 | 47437919.096686 |
| 0.163 | 47437919.096686 |
| 0.164 | 47437919.096686 |



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| 0.165 | 47437919.096686 |
| 0.166 | 47437919.096686 |
| 0.167 | 47437919.096686 |
| 0.168 | 47437919.096686 |
| 0.169 | 47437919.096686 |
| 0.17  | 47437919.096686 |
| 0.171 | 47437919.096686 |
| 0.172 | 47437919.096686 |
| 0.173 | 47437919.096686 |
| 0.174 | 47437919.096686 |
| 0.175 | 47437919.096686 |
| 0.176 | 47437919.096686 |
| 0.177 | 47437919.096686 |
| 0.178 | 47437919.096686 |
| 0.179 | 47437919.096686 |



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| 0.18  | 47437919.096686 |
| 0.181 | 47437919.096686 |
| 0.182 | 47437919.096686 |
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| 0.184 | 47437919.096686 |
| 0.185 | 47437919.096686 |
| 0.186 | 47437919.096686 |
| 0.187 | 47437919.096686 |
| 0.188 | 47437919.096686 |
| 0.189 | 47437919.096686 |
| 0.19  | 47437919.096686 |
| 0.191 | 47437919.096686 |
| 0.192 | 47437919.096686 |
| 0.193 | 47437919.096686 |
| 0.194 | 47437919.096686 |



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| 0.195 | 47437919.096686 |
| 0.196 | 47437919.096686 |
| 0.197 | 47437919.096686 |
| 0.198 | 47437919.096686 |
| 0.199 | 47437919.096686 |
| 0.2   | 47437919.096686 |
| 0.201 | 47437919.096686 |
| 0.202 | 47437919.096686 |
| 0.203 | 47437919.096686 |
| 0.204 | 47437919.096686 |
| 0.205 | 47437919.096686 |
| 0.206 | 47437919.096686 |
| 0.207 | 47437919.096686 |
| 0.208 | 47437919.096686 |
| 0.209 | 47437919.096686 |



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| 0.21  | 47437919.096686 |
| 0.211 | 47437919.096686 |
| 0.212 | 47437919.096686 |
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| 0.214 | 47437919.096686 |
| 0.215 | 47437919.096686 |
| 0.216 | 47437919.096686 |
| 0.217 | 47437919.096686 |
| 0.218 | 47437919.096686 |
| 0.219 | 47437919.096686 |
| 0.22  | 47437919.096686 |
| 0.221 | 47437919.096686 |
| 0.222 | 47437919.096686 |
| 0.223 | 47437919.096686 |
| 0.224 | 47437919.096686 |



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| 0.225 | 47437919.096686 |
| 0.226 | 47437919.096686 |
| 0.227 | 47437919.096686 |
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| 0.229 | 47437919.096686 |
| 0.23  | 47437919.096686 |
| 0.231 | 47437919.096686 |
| 0.232 | 47437919.096686 |
| 0.233 | 47437919.096686 |
| 0.234 | 47437919.096686 |
| 0.235 | 47437919.096686 |
| 0.236 | 47437919.096686 |
| 0.237 | 47437919.096686 |
| 0.238 | 47437919.096686 |
| 0.239 | 47437919.096686 |





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| 0.24  | 47437919.096686 |
| 0.241 | 47437919.096686 |
| 0.242 | 47437919.096686 |
| 0.243 | 47437919.096686 |
| 0.244 | 47437919.096686 |
| 0.245 | 47437919.096686 |
| 0.246 | 47437919.096686 |
| 0.247 | 47437919.096686 |
| 0.248 | 47437919.096686 |
| 0.249 | 47437919.096686 |
| 0.25  | 47437919.096686 |
| 0.251 | 47437919.096686 |
| 0.252 | 47437919.096686 |
| 0.253 | 47437919.096686 |
| 0.254 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.255 | 47437919.096686 |
| 0.256 | 47437919.096686 |
| 0.257 | 47437919.096686 |
| 0.258 | 47437919.096686 |
| 0.259 | 47437919.096686 |
| 0.26  | 47437919.096686 |
| 0.261 | 47437919.096686 |
| 0.262 | 47437919.096686 |
| 0.263 | 47437919.096686 |
| 0.264 | 47437919.096686 |
| 0.265 | 47437919.096686 |
| 0.266 | 47437919.096686 |
| 0.267 | 47437919.096686 |
| 0.268 | 47437919.096686 |
| 0.269 | 47437919.096686 |



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| 0.27  | 47437919.096686 |
| 0.271 | 47437919.096686 |
| 0.272 | 47437919.096686 |
| 0.273 | 47437919.096686 |
| 0.274 | 47437919.096686 |
| 0.275 | 47437919.096686 |
| 0.276 | 47437919.096686 |
| 0.277 | 47437919.096686 |
| 0.278 | 47437919.096686 |
| 0.279 | 47437919.096686 |
| 0.28  | 47437919.096686 |
| 0.281 | 47437919.096686 |
| 0.282 | 47437919.096686 |
| 0.283 | 47437919.096686 |
| 0.284 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.285 | 47437919.096686 |
| 0.286 | 47437919.096686 |
| 0.287 | 47437919.096686 |
| 0.288 | 47437919.096686 |
| 0.289 | 47437919.096686 |
| 0.29  | 47437919.096686 |
| 0.291 | 47437919.096686 |
| 0.292 | 47437919.096686 |
| 0.293 | 47437919.096686 |
| 0.294 | 47437919.096686 |
| 0.295 | 47437919.096686 |
| 0.296 | 47437919.096686 |
| 0.297 | 47437919.096686 |
| 0.298 | 47437919.096686 |
| 0.299 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.3   | 47437919.096686 |
| 0.301 | 47437919.096686 |
| 0.302 | 47437919.096686 |
| 0.303 | 47437919.096686 |
| 0.304 | 47437919.096686 |
| 0.305 | 47437919.096686 |
| 0.306 | 47437919.096686 |
| 0.307 | 47437919.096686 |
| 0.308 | 47437919.096686 |
| 0.309 | 47437919.096686 |
| 0.31  | 47437919.096686 |
| 0.311 | 47437919.096686 |
| 0.312 | 47437919.096686 |
| 0.313 | 47437919.096686 |
| 0.314 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.315 | 47437919.096686 |
| 0.316 | 47437919.096686 |
| 0.317 | 47437919.096686 |
| 0.318 | 47437919.096686 |
| 0.319 | 47437919.096686 |
| 0.32  | 47437919.096686 |
| 0.321 | 47437919.096686 |
| 0.322 | 47437919.096686 |
| 0.323 | 47437919.096686 |
| 0.324 | 47437919.096686 |
| 0.325 | 47437919.096686 |
| 0.326 | 47437919.096686 |
| 0.327 | 47437919.096686 |
| 0.328 | 47437919.096686 |
| 0.329 | 47437919.096686 |



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|       |                 |
|-------|-----------------|
| 0.33  | 47437919.096686 |
| 0.331 | 47437919.096686 |
| 0.332 | 47437919.096686 |
| 0.333 | 47437919.096686 |
| 0.334 | 47437919.096686 |
| 0.335 | 47437919.096686 |
| 0.336 | 47437919.096686 |
| 0.337 | 47437919.096686 |
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## Urban Transportation Systems Engineering Lab

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| 0.836 | 47437919.096686 |
| 0.837 | 47437919.096686 |
| 0.838 | 47437919.096686 |
| 0.839 | 47437919.096686 |





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| 0.841 | 47437919.096686 |
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| 0.847 | 47437919.096686 |
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| 0.85  | 47437919.096686 |
| 0.851 | 47437919.096686 |
| 0.852 | 47437919.096686 |
| 0.853 | 47437919.096686 |
| 0.854 | 47437919.096686 |



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| 0.855 | 47437919.096686 |
| 0.856 | 47437919.096686 |
| 0.857 | 47437919.096686 |
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| 0.859 | 47437919.096686 |
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| 0.866 | 47437919.096686 |
| 0.867 | 47437919.096686 |
| 0.868 | 47437919.096686 |
| 0.869 | 47437919.096686 |



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| 0.877 | 47437919.096686 |
| 0.878 | 47437919.096686 |
| 0.879 | 47437919.096686 |
| 0.88  | 47437919.096686 |
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| 0.882 | 47437919.096686 |
| 0.883 | 47437919.096686 |
| 0.884 | 47437919.096686 |



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| 0.887 | 47437919.096686 |
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| 0.89  | 47437919.096686 |
| 0.891 | 47437919.096686 |
| 0.892 | 47437919.096686 |
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| 0.898 | 47437919.096686 |
| 0.899 | 47437919.096686 |



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| 0.907 | 47437919.096686 |
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| 0.909 | 47437919.096686 |
| 0.91  | 47437919.096686 |
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| 0.912 | 47437919.096686 |
| 0.913 | 47437919.096686 |
| 0.914 | 47437919.096686 |



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| 0.915 | 47437919.096686 |
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| 0.926 | 47437919.096686 |
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| 0.929 | 47437919.096686 |



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| 0.937 | 47437919.096686 |
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| 0.941 | 47437919.096686 |
| 0.942 | 47437919.096686 |
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| 0.945 | 47437919.096686 |
| 0.946 | 47437919.096686 |
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| 0.95  | 47437919.096686 |
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| 0.964 | 47437919.096686 |
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| 0.967 | 47437919.096686 |
| 0.968 | 47437919.096686 |
| 0.969 | 47437919.096686 |
| 0.97  | 47437919.096686 |
| 0.971 | 47437919.096686 |
| 0.972 | 47437919.096686 |
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| 0.975 | 47437919.096686 |
| 0.976 | 47437919.096686 |
| 0.977 | 47437919.096686 |
| 0.978 | 47437919.096686 |
| 0.979 | 47437919.096686 |
| 0.98  | 47437919.096686 |
| 0.981 | 47437919.096686 |
| 0.982 | 47437919.096686 |
| 0.983 | 47437919.096686 |
| 0.984 | 47437919.096686 |
| 0.985 | 47437919.096686 |
| 0.986 | 47437919.096686 |
| 0.987 | 47437919.096686 |
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| 0.99  | 47437919.096686 |
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| 0.992 | 47437919.096686 |
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| 0.994 | 47437919.096686 |
| 0.995 | 47437919.096686 |
| 0.996 | 47437919.096686 |
| 0.997 | 47437919.096686 |
| 0.998 | 47437919.096686 |
| 0.999 | 47437919.096686 |