Q1:

From excel, we got the results below when b = 1.2 and b = 2

A white grid with numbers

Description automatically generatedA white grid with numbers

Description automatically generated

Because the actual accessibility with b = 2 is smaller than it is with b = 1.2, smaller b implies that the residential zones distribute more evenly.

Q2:

Q3:

1. I prefer model 2 because Model 1 uses continuous variables, which might be more straightforward to interpret for real-valued changes in car ownership. However, Model 2 differentiates between one car and two or more cars, which may provide more detailed insights into household car ownership's impact. Moreover, Model 2 has a slightly higher R squared value (0.601) than Model 1 (0.589), indicating a marginally better fit. Model 2’s use of dummy variables allows it to capture differences between households with different levels of car ownership more explicitly.
2. For Model 1, we can use x2​=1 and x2=2 to see how trip generation changes with car ownership.

For Model 2, we’ll use Z1=1, Z2=0 (one car) and Z1=0, Z2=1 (two or more cars).A graph of a graph of a number of workers in a household

Description automatically generatedIt is obvious that model 2 results in a clearer separation for households with different car ownership.

1. For a zone with:

**1000 households** (with an average of **two workers per household**),

**50%** with no cars, **35%** with one car, and **15%** with exactly two cars:

**Using Model 1**

For households with **no cars** (x2=0): y=0.50+2.0(2)+1.5(0)= 4.5

For households with **one car** (x2=1): y=0.50+2.0(2)+1.5(1)=6.0

For households with **two cars** (x2=2): y=0.50+2.0(2)+1.5(2)=7.5

Total trips:

1000×0.5×4.5+1000×0.35×6.0+1000×0.15×7.5=5475

**Using Model 2**

For households with **no cars** (Z1=0​, Z2=0): y=0.01+2.3(2)+1.1(0)+4.1(0)=4.61

For households with **one car** (Z1=1, Z2​=0): y=0.01+2.3(2)+1.1(1)+4.1(0)=5.71

For households with **two cars** (Z1=0, Z2=1): y=0.01+2.3(2)+1.1(0)+4.1(1)=8.61

Total trips:

1000×0.5×4.61+1000×0.35×5.71+1000×0.15×8.61= 5610

Conclusion:

Model 2 predicts a slightly higher number of trips than Model 1, likely due to the inclusion of the dummy variables Z1and Z2, which capture the variation in trip generation based on car ownership more specifically. Model 2’s higher trip estimate suggests that households with more cars may have more flexibility in making work trips.

Q4:

Q5:

2)the blank space means none

A screenshot of a graph

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3) the blank space means none

A grid of white squares with black numbers

Description automatically generated

4) The network is weakly connected because there is no path from node 1 to node 6

5)

Paths from Node 1:

- 1 → 2

- 1 → 3

- 1 → 2 → 3

- 1 → 2 → 4

- 1 → 2 → 5

- 1 → 3 → 4

- 1 → 3 → 5

- 1 → 2 → 3 → 4

- 1 → 2 → 3 → 5

- 1 → 2 → 4 → 5

- 1 → 2 → 4 → 6

- 1 → 2 → 5 → 6

- 1 → 3 → 4 → 5

- 1 → 3 → 4 → 6

- 1 → 3 → 5 → 6

- 1 → 2 → 3 → 4 → 5

- 1 → 2 → 3 → 4 → 6

- 1 → 2 → 3 → 5 → 6

- 1 → 2 → 4 → 5 → 6

- 1 → 3 → 4 → 5 → 6

- 1 → 2 → 3 → 4 → 5 → 6

Paths from Node 2:

- 2 → 3

- 2 → 4

- 2 → 5

- 2 → 3 → 4

- 2 → 3 → 5

- 2 → 4 → 5

- 2 → 4 → 6

- 2 → 5 → 6

- 2 → 3 → 4 → 5

- 2 → 3 → 4 → 6

- 2 → 3 → 5 → 6

- 2 → 4 → 5 → 6

- 2 → 3 → 4 → 5 → 6

Paths from Node 3:

- 3 → 4

- 3 → 5

- 3 → 4 → 5

- 3 → 4 → 6

- 3 → 5 → 6

- 3 → 4 → 5 → 6

Paths from Node 4:

- 4 → 5

- 4 → 6

- 4 → 5 → 6

Paths from Node 5:

- 5 → 6

6)