

CE 3500: Homework 1
Due Friday, February 4

If the answer to any of the following question is “it depends,” say what it depends on, and explain how your answer might differ for the different possibilities.

Problem 1. You have collected data (shown on the next page) from travel surveys about the number of recreational trips a household takes in a month:

1. Perform a linear regression on the number of recreational trips made.
2. On average, how many trips would you expect a household of four members to make in a given month, assuming two of them are children under 12, one of them is a worker, and their annual income is \$56,000?
3. What is the effect on the number of recreational trips if the household size is increased by one?
4. Your supervisors are curious about the role household size and composition plays in recreational trip-making. However, they haven’t taken any courses in statistics or engineering (that’s why they hired you as a specialist!). Answer their question *without using any technical or mathematical language*.

Problem 2. You are given the following (unbalanced) production and attractions data for the three zones in your city, as well as these friction factors:

Zone	A_w (Raw)	A_s (Raw)	P_w	P_s	Φ	1	2	3
1	48,000	33,000	63,000	33,000	1	1	1/3	1/4
2	53,000	50,000	92,000	12,000	2	1/3	1	1/2
3	72,000	19,000	56,000	62,000	3	1/4	1/2	1

Create the (balanced) OD matrix for the morning peak period.

Problem 3. Think about your own household, and how you travel to Denver. Assume that CDOT wants to improve US-287 so it is a divided, multilane facility (like the upgrade WYDOT recently made near Tie Siding). Since funding is scarce, they choose to levy a \$10 toll for each vehicle entering Colorado on US-287 (this way, the users of the road pay, and they don’t have to raise taxes across the state). Which of the following travel decisions would change for your household? (1) the total number of trips made to Denver; (2) the mode of transportation you use; (3) the route you take to get to Denver. For each of these, say why or why not.

Problem 4. Name three simplifying assumptions that are used in the mode choice and route choice steps. Pick one of them, and explain how you could change the procedure to relax this assumption and make the process more realistic.

Household	Size	Children under 12	Workers	Income	Recreational trips
1	1	0	0	7000	0.9
2	2	0	1	18000	0.7
3	5	0	1	49000	0.5
4	2	0	1	32000	0.6
5	5	1	2	36000	1.3
6	2	0	1	30000	0.1
7	4	0	2	59000	0.5
8	2	0	1	38000	0.2
9	3	1	0	34000	2.0
10	3	1	1	47000	1.6
11	5	0	0	34000	1.4
12	2	0	1	27000	0.6
13	4	0	0	28000	0.7
14	3	0	0	55000	1.7
15	2	0	0	23000	0.4