

**Civil Systems Investment Planning and Pricing (12-706) /
Quantitative Methods for Policy Analysis (19-702) /**

Homework 1 (Due Wednesday Sept. 5 at start of class - 10% penalty per day late)

Note: This is a group homework assignment. You must work in a group, of up to 3 students, in answering these questions. Individual assignments will not be accepted. The whole group needs to only submit one answer on behalf of all group members (be sure to list all group members on your answers). Please use the posted sample estimation document as a minimal guide on how to write your answer (and the CIT writing rubric from the syllabus). If you use Excel, please print out your cell formulas and values (hint: use CTRL-~). Make sure row/column titles are visible!

Question 1 (15 pts): Complete the task that we started in class, namely the group estimation problem. Please submit the following parts:

- a) [5 pts] A summary of the question chosen, estimation model used, assumptions, and preliminary result from class (done completely without additional data resources).
- b) [5 pts] Do some quick research (e.g., using web searches or - gasp! - actual books at the library) and try to collect better data for your estimation. Do not spend more than 45 minutes on this search. Feel free to change your model based on data you find. Write a short summary of data sources searched, used, and final data obtained.
- c) [5 pts] With your updated model, provide a summary of your new lower bound, best guess, and upper bound range of estimates.

Question 2 (15 pts): In this problem, you will estimate the total number of people that drive to campus on an average weekday, including all faculty, staff, and students. Consider that the motivation for this estimation is that you are trying to determine the effects on roadway congestion from CMU commuters, or are trying to determine alternative bus routes to reduce the number of drivers.

Note: Please do each part honestly, without looking ahead. This is how you become proficient at such problems, and 'cheating' by finding the answer ahead of time will only hurt your ability to improve. Remember that I care much more about your 'process' than I do about your answer.

- a) [6 pts] Estimate the total number of people that drive, and **report a range of values.** Feel free to use a calculator for this, but NOT a computer. I want you to do this on paper.
- b) [3 pts] **AFTER YOU HAVE AN ESTIMATE from part (a),** try to validate your answer as best you can with data sources from the CMU website. For example, **how close** do you think you were to the “real answer” and **comment** on the 'difference' between your estimate and the real data,

specifically on how your choices of assumptions might have led to the difference. Was your estimate **realistic**?

One handy source is the CMU factbook at <http://www.cmu.edu/ira/facts1.htm> , you may find other sources also.

- c) [6 pts] Given your findings in part (b), use a **more complex** analysis (either on paper or via Excel) to make your 'original estimate' better and **give a range** where the actual answer fits. **Use ranges** of assumptions, more robust assumptions, etc.