

INDE 597
Homework 1
Due date 1/28

- 1) Your friend visits Houston for the first time and asks you to show her around. You decide to meet at the Rice University campus, then visit the Art Car Museum, Gerald D. Hines Waterwall Park, the Menil Collection, and the Downtown Aquarium, then return to Rice University campus. You want to take the trip that will require the least amount of total travel time.
 - a) Formulate this problem as an integer program, find the data for the problem (e.g. using Google maps), and solve the IP you formulated with the data you found using an IP solver (e.g. Gurobi). Turn in your IP formulation, the data you used, a printout of the code you used to run your IP solver, and the optimal tour you found.
 - b) Suppose that before you find the optimal tour, your friend asks you to give her a quick estimate of how long the trip will take. Use a greedy tour (i.e., start from Rice, visit the closest yet-unvisited attraction until all attractions have been visited, and then return to Rice) to obtain an upper bound on the travel time, and use a 1-tree tour (i.e., find a min-weight spanning tree of the four attractions and add the two min-weight edges from Rice to this tree) to obtain a lower bound.

- 2) You go to a party where some guests aren't friends, but for any partition of the guests into two nonempty groups, there is a person in the first group who is friends with someone in the second group.
 - a) Suppose that each pair of friends at the party has exactly one mutual friend. Can there be an even number of people at the party?
 - b) Suppose that each pair of friends at the party has exactly two mutual friends. Can there be an even number of people at the party?

Justify your answers.