HW 5: Discrete Location

ISE 754: Logistics Engineering **Fall 2019**

Assigned: Wed, 25 Sep (Groups of 2) Due: 11:30a, Mon, 7 Oct

Solve questions 1(a) by hand (you can submit a scanned copy of your solution, or you can just turn in a paper copy in class) and then, for questions 1(b) to 4, create a script in Matlab that performs the calculations needed to answer each question, one cell for each part of each question. Please submit your script and either diary or "published" output file via Moodle.

1. The table below contains the variable costs associated with serving four EFs from a NF located at one of four sites. If the fixed costs of locating a NF at any site are 30, (a) show, by hand, each step of the *UFLADD* procedure used to determine the number and location of NFs, (b) use Matlog's *UFLADD* function to determine the solution, and (c) formulate as a MILP and solve.

	1	2	3	4
1	0	92	30	46
2	92	0	40	94
3	30	40	0	18
4	46	94	18	0

2. Gipfel, Inc., has wholesale distributors located throughout the continental U.S. that sell the products manufactured in its twelve plants. Each plant manufactures the same mix of products. Gipfel would like for you to determine if they should consider either constructing more plants and/or closing some of their existing plants. The 5-digit ZIP code and annual demand (in tons) for each wholesaler is provided in worksheet *Customers* of spreadsheet *HW5data.xlsx* (see Course Schedule for data link). In the *Plants* worksheet, the city, state, annual production and procurement cost, and the annual cost to distribute products to wholesalers is provided for each plant.
3. UNCTV is planning to install new ATSC 3.0 TV broadcasting transmitters throughout North Carolina. The transmitters have a 50-mile maximum signal range and UNCTV would like to reach, at the least cost, as many people in North Carolina with a signal as possible, but they plan to install the transmitters only in cities with a population of at least 10,000. They would like you to recommend where transmitters should be installed, and how much of the state's population would be covered. You do not need to consider any existing UNCTV facilities in your analysis.
4. Modify *EXAMPLE 4: UFL with n,m = 104* of script `makeFacLoc7.m` so that each NF established can serve a maximum total population of 400,000 people. What is the impact of this constraint?