

Project 1: Facility Location

ISE 453: Design of PLS Systems

Spring 2020

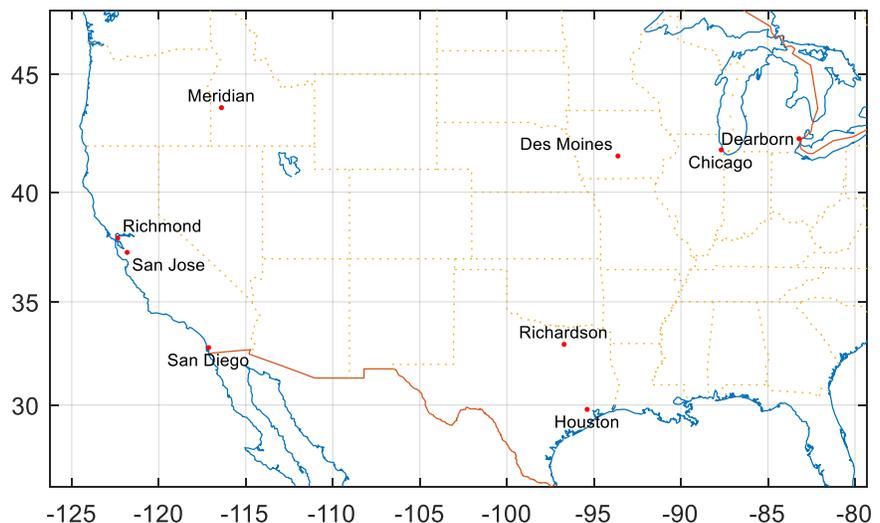
Assigned: Tue, 4 Feb (Groups of up to 4)

Due: Tue, 11 Feb

You should create an Excel spreadsheet and a one-page summary (in Word) that solves the following problem (please submit your spreadsheet via Moodle—all of your calculations should be performed in the spreadsheet, while your summary should explain any aspects of your analysis that are not clearly described in your spreadsheet).

A new DC is to be built to supply six stores with three different items. The annual demand for items A, B, and C is 16,000, 10,000, and 21,000 units, respectively, and each item will be shipped to the DC from the firm's manufacturing plants located in San Jose, Richardson, and Chicago. Each plant is dedicated to the production of A, B, and C, respectively, and it has been estimated that its unit production costs at each plant is \$450, \$875, and \$275, respectively. The city and demand percentage is shown in the table below for each store, where it can be assumed that each store requires each item in a proportion equal to the total demand for the item. Each unit of A, B, and C will be shipped P2P TL to the DC in 25, 16, and 9 ft³ cartons that each weigh 90, 300, and 120 lb, respectively, and loads containing a mix of all of the items will be shipped P2P TL from the DC to each store.

Store_City	Dem_Pct
'Houston'	21
'San Diego'	9
'Richmond'	16
'Meridian'	21
'Des Moines'	15
'Dearborn'	18



1. Where should the DC be located (in decimal degrees and nearest city) in order to minimize total transportation cost? You can assume great-circle distances, full truckload transport, and that the maximum weight and cube capacities are 25 tons and 2750 ft³, respectively.
2. Using the most recent TL rate estimate and assuming store demand is nearly constant and that inbound and outbound shipments to/from the DC are uncoordinated, what is the annual total logistics cost assuming approximate actual road distances can be approximated using a circuitry factor of 1.2, the annual inventory carrying rate is 0.3 for all items, and that all truck transport is contracted one-way travel?
3. What would be the impact on annual total logistics cost if each store required weekly instead of full truckload shipments?