IE363 Logistics Management
Homework 1
Due Date: 14.11.2025 Friday at 23:55 thru AYBUZEM

Instructions: *You can work in groups of at least **2** or at most **4**. Use a spreadsheet to facilitate the answers, but you must construct the mathematical programming models when needed, explain your model and answers in the assignment. You must upload a typed MSWord document and MsExcel spreadsheet or an MsExcel Solver or Gams file. Make sure to upload your Ms Word document to the Turnitin enabled submission and all other files (Excel, Gams etc.) as another zip/rar file.*
CAUTION!!! *Be careful about **plagiarism**. I will take Turnitin reports for all your submissions. DO NOT USE ANY WORK THAT IS NOT YOURS. IT WILL BE PENALIZED WITH RESPECT TO YOUR PLAGIARISM PERCENTAGE AND INSTRUCTOR ASSESSMENT. For example, if Turnitin gives 70% plagiarism for your homework and your grade was supposed to be 90 out of 100, you will get 90*0.30 = 27 out of 100 from your assignment as a grade*

Question 1 (40 pts).
Solve and explain the following question. Data set is provided in the course web site.

SC Consulting, a supply chain consulting firm, must decide on the location of its home offices. Its clients are located primarily in the 16 states listed in Table 5-5. There are four potential sites for home offices: Los Angeles, Tulsa, Denver, and Seattle. The annual fixed cost of locating an office in Los Angeles is **$165,428**, Tulsa is **$131,230**, Denver is **$140,000**, and Seattle is **$145,000**. The expected number of trips to each state and the travel costs from each potential site are shown in Table 5-5.

Each consultant is expected to take at most **25 trips** each year.

a. If there are no restrictions on the number of consultants at a site and the goal is to minimize costs, where should the home offices be located and how many consultants should be assigned to each office? What is the annual cost in terms of the facility and travel?

b. If, at most, 10 consultants are to be assigned to a home office, where should the offices be set up? How many consultants should be assigned to each office? What is the annual cost of this network?

c. What do you think of a rule by which all consulting projects out of a given state are assigned to one home office? How much is this policy likely to add to cost compared to allowing multiple offices to handle a single state?

Question 2 (60 pts).
Solve and explain the following question. Data set is provided in the course web site. (*Hint*: Total Variable Production Costs, Transportation Costs and Duties From Plants to Markets is also given on the spreadsheet.)

Sleekfon and Sturdyfon are two major cell phone manufacturers that have recently merged. Their current market sizes are as shown in Table 5-9. All demand is in millions of units.

Sleekfon has three production facilities in Europe (EU), North America, and South America. **Sturdyfon** also has three production facilities in Europe (EU), North America, and Rest of Asia/Australia. The capacity (in millions of units), annual fixed cost (in millions of $), and variable production costs ($ per unit) for each plant are as shown in Table 5-10.

Transportation costs between regions are as shown in Table 5-11. All transportation costs are shown in $ per unit.

Duties are applied on each unit based on the fixed cost per unit capacity, variable cost per unit, and transportation cost. Thus, a unit currently shipped from North America to Africa has a fixed cost per unit of capacity of **$5.00**, a variable production cost of **$5.50**, and a transportation cost of **$2.20**. The 25 percent import duty is thus applied on **$12.70 (5.00 + 5.50 + 2.20)** to give a total cost on import of **$15.88**. For the questions below, assume that market demand is as in Table 5-9.

The merged company has estimated that scaling back a 20-million-unit plant to 10 million units saves **30 percent in fixed costs**. Variable costs at a scaled-back plant are unaffected. Shutting a plant down (either 10 million or 20 million units) saves **80 percent in fixed costs**. Fixed costs are only partially recovered because of severance and other costs associated with a shutdown.

a. What is the lowest cost achievable for the production and distribution network prior to the merger? Which plants serve which markets?

b. What is the lowest cost achievable for the production and distribution network after the merger if none of the plants is shut down? Which plants serve which markets?

c. *What is the lowest cost achievable for the production and distribution network after the merger if plants can be scaled back or shut down in batches of 10 million units of capacity? Which plants serve which markets?*