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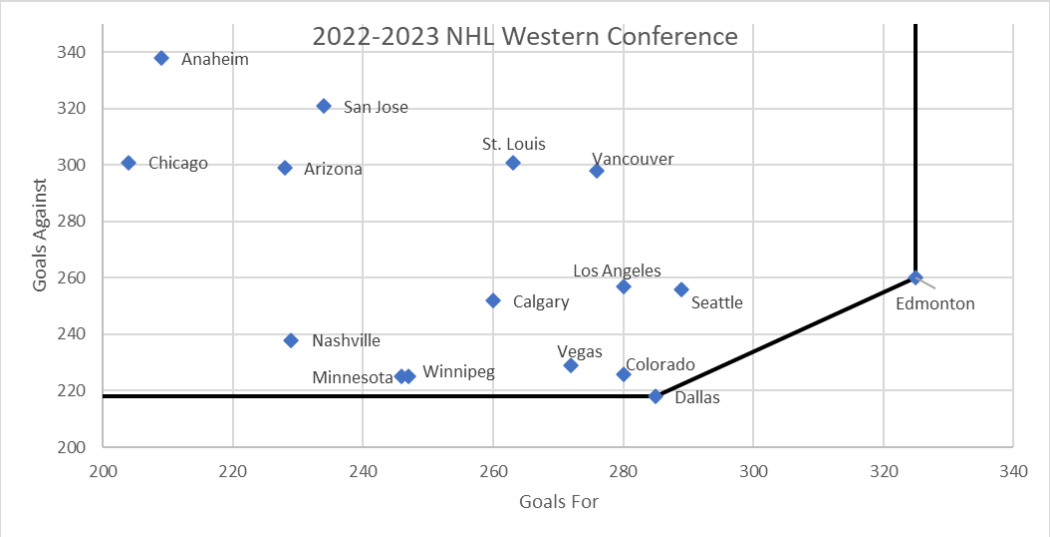
Multiple Choice Questions (4 pts.)



The plot above shows an efficient frontier for the hockey teams in the Western Conference of the NHL for 2022-2023, based on "Goals For" and "Goals Against". Higher numbers are better for "Goals For", and lower numbers are better for "Goals Against".

1. (1 pt.) Which one of the following is true?
   a. Winnipeg dominates Los Angeles
   b. Edmonton dominates Calgary
   c. Colorado dominates Anaheim
   d. Anaheim dominates Arizona

2. (1 pt.) Other than Dallas and Edmonton, which other NHL team is not dominated by any other team in this dataset?
   a. Seattle
   b. Minnesota
   c. Nashville
   d. Chicago

3. (1 pt.) Which one of the following is <u>true</u> for a resource that is not fully used in the optimal solution?
   a. Its shadow price is zero
   b. Its allowable increase is a very large number
   c. The optimal solution does not change if we get additional units of that resource
   d. All of the above

4. (1 pt.) The formula =IF(RAND()>0.8,"Tie",IF(RAND()>0.4,"Win","Lose")) returns "Win" with a probability of
   a. 32%
   b. 48%
   c. 16%
   d. 12%

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Postoptimality analysis (3 pts.)

The "SR" worksheet contains the sensitivity report for a modified version of the Leduc Control example we had in HW5. Answer Questions 5-7 based on this worksheet.

5. (1 pt.) What is total net margin of the optimal solution?
6. (1 pt.) Assume the net margin per unit of CG 508 increases to $2400. Does this increase change the optimal solution?
7. (1 pt.) If the number of assembly hours increase by 100, how much does the total net margin change? Enter zero for no change, a positive number for increase, and a negative number for decrease.

OM Club Excel competition (8 pts.)

The OM Club is hosting an Excel skills competition, and their genius Director of Competitions is planning the event. The OM Club has to decide which location to host the competition. Each of the three potential locations (ECHA, Business, CAB) has a different maximum capacity and rental cost.

The "OM Club" worksheet contains a partially completed simulation model, including 20 frozen RAND values. Assume that the number of students wanting to participate in the competition (demand) is normally distributed, with a different mean and standard deviation for each location. Simulated Demand should be rounded to an integer and converted to zero if negative. In addition to the location rental costs, it also costs $1.50 per participant to run the competition. The OM Club will decide the location based on the lowest cost per participant:

Total Cost / # of Participants = (Rental Cost + $1.5 * # of Participants) / # of Participants.

Complete the simulation model and answer the following Questions 8-9. All the formulas already entered are correct.

8. (6 pts.) For replications 6 and 11, report the simulated demand, the number of participants, and the cost per participant for each of the 3 locations.
9. (2 pts.) Report the average and standard deviation for the cost per participant for each location.

WestPlast, revisited (5 pts.)

The "WestPlast" worksheet has data for a modified version of the WestPlast case. WestPlast is no longer interested in maximizing the PCI index. They are only interested in maximizing their revenue now. The revenue per thousands of tons from each product, production capacity, demand, and contract (all in thousands of tons) are given in the "WestPlast" worksheet. The solver has the correct settings for finding the optimal solution to the following problem:

Maximize:	Total revenue
By changing:	The amount produced from each product
Subject to:	Contract ≤ Amount produced from each product ≤ demand
	Total production ≤ capacity

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We have already run Solver in this worksheet to solve the problem described above. You can see that the current optimal solution produces 8 products, given the production capacity of 165 thousands of tons. Assume we are able to increase the production capacity by 25 thousands of tons per one fewer product produced (compared to producing 8 products as per the current solution). This means that if you limit the number of products produced to 7, the capacity will increase to 190 (=165+25). If you produce only 6 products, the capacity will increase to 215 (=165+2×25). And so on and so forth. We are interested in finding out how many products we should drop from the current production plan.

10. (3 pts. feasibility, 1 pt. consistency, 1 pt. optimality) Modify the model as necessary to find the optimal solution to this new problem. Report the optimal number of products to drop from the original production plan, the amounts produced from each product, the new production capacity, and the total revenue of the new optimal solution.

Short Answer Question (2 pts.)

11. (2 pts.) In the Bard Outside example, why didn't we use the same RAND() values for simulating both weather and demand? Keep your answer under 200 characters.