

**EXTRA CREDIT 1**

The attached problem should be solved for up to 10 extra credit points. Solve the problem using the methods learned to date in the course and answer the questions completely. Your answers should be uploaded to Blackboard in a document or spreadsheet (.txt, .docx, .xlsx) with each part clearly identified along with its answer.

The problem will be accepted until Sunday, November 6 at 10:00pm. You can upload your answer at any time before but it must be submitted no later than this time.

Note that this is different than the Assignment and Test methods, where you are presented with a set of questions to answer on-line. For this problem, you should provide your answers in a document that you have created using Word, Excel, or using a text program (like Notepad or Textedit). In the Assignments section of Blackboard (not Assessments)

**This is an individual, closed book assignment and students are expected to complete it individually and without the help of others in the class, other students, or use of the textbook, slides, or notes. This is no different than the Test expectations.**

**Scoring:** The points are added to each student's total points earned; the course total is still 500 points. The problem is optional and not required. Answer the questions completely. Provide an explanation of how you arrived at your solution; partial credit will be given but explain how you arrived at your answer or conclusion to receive full credit.

**PROBLEM**

The linear programming problem formulation shown below determines how many DVD players, HD TVs, game consoles, and entertainment consoles that an electronics store should stock. The objective function measures profit; it is assumed that every piece stocked will be sold. Constraint 1 measures display space in units, constraint 2 measures time to set up the display in minutes. Constraints 3 and 4 are marketing restrictions.

$$\begin{aligned} \text{max } & 100X_1 + 120X_2 + 150X_3 + 125X_4 \\ \text{st } & X_1 + 2X_2 + 2X_3 + 2X_4 \leq 108 \quad (\text{constraint 1}) \\ & 3X_1 + 5X_2 + X_4 \leq 120 \quad (\text{constraint 2}) \\ & X_1 + X_3 \leq 25 \quad (\text{constraint 3}) \\ & X_2 + X_3 + X_4 \geq 50 \quad (\text{constraint 4}) \end{aligned}$$

For each of the questions below, **explain how you arrived at your answer or conclusion.**

- a. How many of the DVD players, HD TVs, game consoles, and entertainment consoles should be stocked?
- b. How much space will be left unused?
- c. How much set-up time will be used?
- d. By how much will the second marketing restriction be exceeded? What is your conclusion based on?
- e. What is the profit that the electronics store will earn?
- f. To what value can the profit on DVD players drop before the solution would change?
- g. By how much can the amount of display space decrease before there is a change in the profit?
- h. Can the electronics store use this solution if the profits on games consoles and entertainment consoles were increased by 10% each?

**K327 Deterministic Models in OR**

**Extra Credit Problem 1**

**November 3, 2011**

- i. You are offered the chance to obtain more space. The offer is for 15 units and the total price is 1500. What should you do?
- j. Interpret the dual price of constraint 4.

Your answers should be provided in a document that is uploaded to Blackboard before Sunday, November 6 at 10:00pm. Select Extra Points 1 in the Assignment section of Blackboard, attached the file that contains your answers, and Submit.