

HW7A SA: Using Excel@ Solver for Modeling and Sensitivity Analysis: Problems 2), 10) and 12)

What to hand in?

1. Cover page with the following items: 1) Title "COB291 LP Sensitivity Analysis" and date and 2) Your name TYPED and your signature for the honor code: On my honor as a JMU student, I pledge that I have neither given nor received any unauthorized assistance on this assignment;
2. Copies of Sensitivity Reports without gridlines for each problem through Premium Solver;
3. Copies of graphic solutions of LP problems showing additional answers as required below; and
4. **Typed report with brief answers for each of the questions below:**

- 1). What is the optimal solution for the problem?
- 2). Are the optimal solution with Solver is the same as your graphic optimal solution?
- 3). Conduct full sensitivity analysis for the objective function coefficient values (OFCV) and answer the following questions:
 - a. What are the lower and upper limits (ranges of changes) for each OFCV?
 - b. What are the optimal solutions for the LP problem if the OFC values changes WITHIN the given lower and upper limits?
 - c. What are the objective function (OFV) values when the OFC values vary within the given lower and upper limits without using Solver again? You may use the lower and upper limits of OFC values to updated OFVs.
 - d. Will the optimal solutions for the LP problem be changed if the OFC values vary OUTSIDE the given lower and upper limits? Show one example.
 - e. Will the OFV be updated without using Solver again?
 - f. Could you show the answers on the graphs for items a through e?
 - g. What is the value of the reduced cost of each decision variable?
 - h. What are the meanings of the reduced cost?
- 4). Conduct full sensitivity analysis for the RHS values of each constraint and answer the following questions
 - i. What are the lower and upper limits (ranges of changes) for the RHS values of each constraint?
 - j. Will the optimal solutions for the LP problem be changed if the RHS values vary WITHIN or OUTSIDE of the given limits? Show one example.
 - k. What are the meanings of the shadow price for a constraint or a RHS value?
 - l. What are the optimal OFV values when the RHS values vary within the given allowable limits? You may use the lower and upper limits of RHS values to update OFV values.
 - m. Could you show the answers on the graphs for items l and j?

2). Ragsdale Page 40, Prob. 7

Min: $2X + 3Y$

$$2X + 1Y \geq 3 \quad (1)$$

$$4X + 5Y \geq 20 \quad (2)$$

$$2X + 8Y \geq 16 \quad (3)$$

$$5X + 6Y \leq 60 \quad (4)$$

$$X, Y \geq 0 \quad (5)$$

10). ASWM Page 71, Prob.12

Max: $3X + 3Y$

$$2X + 4Y \leq 12 \quad (1)$$

$$6X + 4Y \leq 24 \quad (2)$$

$$X, Y \geq 0 \quad (3)$$

12). (Ragsdale, Page 41, Problem 13) The marketing manager for Mountain Mist soda needs to decide how many TV spots and magazine ads to run during the next quarter. Each TV spot costs \$5,000 and is expected to increase sales by 300,000 cans. Each magazine ad costs \$2,000 and is expected to increase sales by 500,000 cans. A total of \$100,000 may be spent on TV and magazine ads; however, Mountain Mist wants to spend no more than \$70,000 on TV spots and no more than \$50,000 on magazine ads. Mountain Mist earns a profit of \$0.05 on each can it sells.