MBA 810 Fall 2023 Final Examination

Pace University Lubin School of Business

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Answer 4 out of 5 questions. Only the first four answered questions will be graded. All work must be shown to qualify for partial credit. Due Date: December 18, 11.59 pm

1. Consider the following linear program

Max $3x1 + 2x2$

s.t.

$$1x1 + 1x2 \leq 10$$

$$3x1 + 1x2 \leq 24$$

$$1x1 + 2x2 \leq 16$$

And $x1, x2 > 0$.

a) Use Excel Solver to find the optimal solution to this problem. State the optimal values of x1, x2, and Z.
b) Assume that the objective function coefficient for x1 changes from 3 to 5. Does the optimal solution change?
c) Assume that the objective function coefficient for x1 remains 3, but the objective function coefficient for x2 changes from 2 to 4. Does the optimal solution change?
d) What are the shadow prices for these constraints?
e) What conclusions can you draw about changes to the right hand side of constraint 2?
f) Identify the binding and non-binding constraints in this problem and explain.

2. The national mean annual salary for school administrator is $90,000 a year (The Cincinnati Enquirer, April 7, 2012). A school official took a sample of 25 school administrators in the state of Ohio to learn about salaries in that state to see if they differed from the national average.

a. Formulate hypotheses that can be used to determine whether the population mean annual administrator salary in Ohio differs from the national mean of $90,000.
b. The sample data for 25 Ohio administrators is contained in the file named *Administrator*. What is the p-value for the hypothesis test in part (a)?
c. At $\alpha = 0.05$, can your null hypothesis be rejected? What is your conclusion?
d. Repeat the preceding hypothesis test using the critical value approach.

3. A recent issue of the AARP Bulletin reported that the average weekly pay for a woman with a high school degree is $520. Suppose you would like to determine if the average

weekly pay for all working women is significantly greater than that for women with a high school degree. Data providing the weekly pay for a sample of 50 working women are available in the file named *WeeklyPay*. These data are consistent with the findings reported in the AARP article.

a. State the hypotheses that should be used to test whether the mean weekly pay for all women is significantly greater than the mean weekly pay for women with a high school degree.
b. Use the data in the file named *WeeklyPay* to compute the mean, the test statistic, and the p-value.
c. Use $\alpha = 0.05$, what is your conclusion?
d. Repeat the hypothesis test using the critical value approach.

4. A company imports goods at two ports: Philadelphia and New Orleans. Shipments of one product are made to customers in Atlanta, Dallas, Columbus, and Boston. For the next planning period, the supplies at each port, customer demands, and shipping costs per case from each port to each customer are as follows:

	Customers				
Port	**Atlanta**	**Dallas**	**Columbus**	**Boston**	**Port Supply**
Philadelphia	2	6	6	2	5000
New Orleans	1	2	5	7	3000
Demand	1400	3200	2000	1400	

a. Develop a network representation of the distribution system (transportation problem).
b. Develop a linear programming model for the problem; be sure to define the variables in your model.
c. Solve the linear program to determine the optimal solution.
d. Discuss the distributions from the Port to the customers.

5. Consumer Reports tested 166 different point-and-shoot digital cameras. Based upon factors such as the number of megapixels, weight (oz), image quality, and ease of use, they developed an overall score for each camera tested. The overall score ranges from 0 to 100, with higher scores indicating better overall test results. Selecting a camera with many options can be a difficult process, and price is certainly a key issue for most consumers. By spending more, will a consumer really get a superior camera? And, do cameras that have more megapixels, a factor often considered to be a good measure of picture quality, cost more than cameras with fewer megapixels. Data file named *Cameras* contains detailed information on the brand, average retail price ($), number of megapixels, weight (oz.), and the overall scores for the cameras.

a. Using overall score as the dependent variable, develop an estimated regression equation given price, megapixels, and weight.
b. What is the "goodness of fit" of your model?
Note: You must follow the processes outlined in class to generate a good and reliable model.