ESCUELA SUPERIOR POLITECNICA DEL LITORAL

Administracíon de Operaciones
Examen de Mejoramiento
Term. II, 2019

Yo, ……………………………………………………………………, al firmar este compromiso, reconozco que el presente examen está diseñado para ser resuelto de manera individual, que puedo usar una calculadora ordinaria para cálculos aritméticos, un lápiz o esferográfico; que sólo puedo comunicarme con la persona responsable de la recepción del examen; y, cualquier instrumento de comunicación que hubiere traído, debo apagarlo y depositarlo en la parte anterior del aula, junto con algún otro material que se encuentre acompañándolo. No debo además, consultar libros, notas, ni apuntes adicionales a las que se entreguen en esta evaluación. Los temas debo desarrollarlos de manera ordenada. Como estudiante de ESPOL me comprometo a combatir la mediocridad y actuar con honestidad, por eso no copio ni dejo copiar. Firmo al pie del presente compromiso, como constancia de haber leído y aceptar la declaración anterior.

Firma: …………………………………….. Nro.Matrícula: ………………………………………………

Paralelo: ………………………......

Your grade will be equal to (X/16)*100. You must show your work. If your work is incorrect, you will not receive points.

1.) You are the manager of a company that sells tennis shoes and boots and you need to decide the optimal number of each to keep in your store. Boots have a unitary profit of $6 and tennis shoes have a unitary profit of $10. Each pair of boots takes up 2 units of shelf space and each pair of tennis shoes takes up 1 unit of shelf space. You have 20 units of shelf space available. Answer the following:

   a. Write a linear programming problem to determine the optimal number of boots and shoes. (1point)

   b. What is the optimal number of boots you should sell? (0.5 point)

   c. What is the optimal number of tennis shoes you should sell? (0.5 point)

d. If you sell the optimal number of tennis shoes and boots, what should your profit be? (1 point)

e. What is your reduced cost for boots? (1 point)

f. What is your reduced cost for tennis shoes? (1 point)

g. What is the maximum amount that you should be willing to pay for one more unit of shelf space? (1 point)

2.) Julia is the principal owner of J's Tees. At the present time, Julia is forced to consider purchasing some more equipment for her company due to competition. Her alternatives are shown in the following table:

Equipment	Good Market	Bad Market
A	$100,000	-$19,000
B	$260,000	-$22,000
C	$410,000	-$30,000

For example, if Julia purchases equipment A and if there is a good market, she will get a profit of $100,000. On the other hand, if the market is bad, Julia will lose $19,000. Julia read in a magazine that the demand for t-shirts is expected to be very high this year. One of the articles in her magazine states that the chances of a good market for t-shirts was 75%, while the chance of a bad market was only 25%. Julia would like to use these probabilities in determining the best decision.

a) What is her optimal decision? (1 point)

b) Now, assume that she can pay a firm $50,000 to do a study to better know the demand for t-shirts. From historical data, she thinks that the probability that the firm correctly predicts a good market is 80% (that is, the probability of the survey predicting a good market given that the market was good is 80%) and the probability that the firm correctly predicts a bad market is 70%. Additionally, she thinks that the survey will predict a good market 75% of the time and a bad market 25% of the time. Draw a decision tree and show her best decision and expected outcomes. (3 points)

3.) Now, let's say that you are the manager of a lighting store that sells lamps and lightbulbs. You order your lightbulbs from a wholesale supplier who offers quantity discounts. Each year, you have an expected demand of 500 lightbulbs. It costs you $20 to place an order and your holding cost is 10% of the unit cost of a lightbulb (note: If you receive a discount, it is 10% of the *discounted* price.) The undiscounted price for lightbulbs is $5. The quantity discount information is given below.

Discount Amount	Quantity of Lightbulbs Ordered
0%	<300
10%	300-399
15%	400-500

Your wholesale supplier is not always consistent about when lightbulbs arrive and your daily demand for lightbulbs is variable too. You have recorded the demand for lightbulbs for 100 days and found that there were 5 days in which 1 lightbulb was sold each day, 10 days 2 lightbulbs were sold each day, 20 days in which 3 light bulbs were sold each day, 40 days in which 4 lightbulbs were sold each day and 25 days in which 5 lightbulbs were sold each day. Additionally, out of 50 previous orders, the shipment of lightbulbs arrived in 1 day for 15 of the orders, 2 days for 30 of the orders and 3 days for 5 of the orders.

Use the above information to answer the following questions.

a.) Determine the optimal number of lightbulbs that you should place an order for each time that you place an order. (1 point)

b.) How many orders will you place each year based on your optimal order quantity that you found in part (a)? (1 point)

c.) What is your total cost based on your optimal order quantity that you found in part (a)? (1 point)

d.) Simulate 10 days of business. Assume that you start your simulation with 30 units in inventory with a reorder point of 4. Use the random numbers provided in the table. What is your total number of lost sales from this simulation? (3 points)

Day	Units Received	Beginning Inventory	Random Number	Demand	Ending Inventory	Lost Sales	Order?	Random Number	Lead Time
1			59					31	
2			95					62	
3			89					75	
4			28					33	
5			84					48	
6			66					43	
7			46					48	
8			9					80	
9			88					97	
10			44					84	