

Jubail University College

Department of Business Administration

Semester 421

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| Assignment No: I | Section No: 201 |
| Course Code: BUS 242 | Course Name: Operation Research |
| Student Name | Student ID |
| 1. |  |
| 2. |  |
| 3. |  |
| 4. |  |
| 5. |  |

SEMESTER 421

OPERATION RESEARCH (BUS 242)

Assignment I

Submission: THURSDAY, Week 6 (Midnight)

**NO. OF STUDENTS IN A GROUP: 3-4**

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| --- | --- | --- |
| S. No. | Student Id. | Name of the student |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4. |  |  |
| 5. |  |  |

MAXIMUM MARKS: 10

|  |  |
| --- | --- |
| Question 1 - (15 Marks) |  |
| Question 2 - (20 Marks) |  |
| Question 3 - (15 Marks) |  |
| Total Mark: Out of 50 marks |  |
| Total Mark: Out of 10 marks |  |

Note:

1. Proper working has to be shown to achieve the conclusions.
2. The assignment must be a MS Word document and uploaded to Blackboard

***Calculations: Answer all the THREE questions***

**Question 1: 15 marks:**

Kholoud owns AlBaha Laundry in Jubail. She has decided to add a new service to her customer by washing rugs. The annual fixed cost of washing the rugs is 60,000 SAR and the variable cost for cleaning each rug is 8 SAR. She will be charging her customers 15 SAR for each rug and has an anticipated demand of 7500 rugs annually.

1. What is the break-even? (3 marks)
2. What will be the profit – loss at the anticipated demand of 7500 rugs? (2 marks)
3. It is anticipated after a few month’s her demand will increase to 10000 rugs. How much will be her new profit-loss? (2 marks)
4. If she is wants to reach the BEP at an anticipated demand of 7500 rugs, what must be the price that she must charge for each item? (2 marks)
5. Kholoud wants to charge a price of 18 SAR/rug, as she feels that if she charges high she may lose her customer. What is your recommendation? (2 marks)
6. Refer to questions (a) draw the graph for breakeven. (4 marks)

**Question 2: 20 marks:**

The Atlanta Confectionary produces two kinds of ice cream — Vanila and Chocolate. The ice cream is produced from 105 tons of condensed sweetened milk for this season. A batch of Vanila requires 3 tons of condensed sweetened milk, and a batch of Chocolate requires 5 tons. However, the total available production time is 180 hours. The processing time for a batch of Vanila is 6 hours, and the processing time for a batch of Chocolate is 5 hours. The amount of Vanila essence used to produce a batch of Vanila ice cream is 0.5 tons and availability of essence is 10 tons; while availability of Coco powder for chocolate ice cream is 15 tons and consumes 0.8 tons for a batch. The profit for a batch of Vanila is 6000 SAR, and the profit for a batch of Chocolate is 9000 SAR. The company wants to determine the number of batches of Vanila and Chocolate to produce in order to maximize profit. (Note: Solve using 2 decimal places)

1. Formulate a linear programming model for this problem. (4 marks)
2. Solve this model by using graphical analysis. (4 marks)
3. Identify the feasible region. (1 mark)
4. Find the extreme points and optimal solution (5 marks)
5. What is the standard form of the linear programming model? (2 marks)
6. How much of slack resource will be left unused at the optimal solution? (2 marks)
7. What are the binding, non-binding and redundant constraints? (1 mark)
8. What would be the effect on the optimal solution, if the profit for a batch of Vanila is $6500? (1 mark)

**Question 3: 15 marks**:

Consider the following linear program: (Note: Solve using 2 decimal places)

Max 5X + 8Y

s.t. 3X + 2Y ≤ 200

1X - 1Y ≥ 10

3X + 2Y ≥ 45

X, Y ≥ 0

1. Use the graphical solution procedure to find the optimal solution. (4 Marks)
2. Conduct a sensitivity analysis to determine the range of optimality for the objective function coefficients X & Y.(5 marks)
3. What are the binding constraints? (1 mark)
4. If the right-hand-side of the binding constraints are marginally increased, what will be the Dual Value? (5 marks)

\*\*\*END OF ASSIGNMENT\*\*\*