KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS & STATISTICS
DHAHRAN, SAUDI ARABIA

MATH 131: FINITE MTHEMATICS

Semester 171
Major Exam Two
Wednesday, November 08, 2017
Allowed time 75 minutes

Instructor: Musawar Amin Malik

Name: ID#:

Serial #: Section:

Directions:

1) You must **show all your work** to obtain full credit.
2) You are allowed to use electronic calculators and other reasonable writing accessories that help write the exam.
3) Do not keep your mobile with you during the exam, turn off your mobile and leave it aside.

Question No	Full Marks	Marks Obtained
Q1	6	
Q2	8	
Q3	5	
Q4	5	
Q5	10	
Q6	10	
Total	44	

1. Solve the following system by the method of reduction:

$$x - y - 3z = -5$$

$$2x - y - 4z = -8$$

$$x + y - z = -1$$

2. A furniture manufacturing company uses wood and labor to produce tables and chairs. The unit profit for tables is $6, and unit profit for chairs is $8. There are 300 board feet (bf) of wood available, and 110 hours of labor available. It takes 30 bf and 5 hours to make a table, and 20 bf and 10 hours to make a chair. How many tables and chairs should be produced to maximize the profit?
   (Note: Use the Graphical method to maximize the furniture manufacturer's profit).

3. Only formulate the problem, do not solve.

A freight company handles shipments by two corporations, A and B that are located in the same city. Corporation A ships boxes that weigh 3 lb each and have a volume of 2- ft^3; B ships 1- ft^3 boxes that weigh 5 lb each. Both A and B ship to the same destination. The transportation cost for each box from A is \$0.80, and from B it is \$0.70. The freight company has a truck with 2200 ft^3 of cargo space and a maximum capacity of 32, 500 lb. In one haul, how many boxes from each corporation should be transported by this truck so that the freight company receives maximum revenue?

4. Write only the dual of the following linear programing problem, do not solve.

Minimize

$$Z = 5x_1 + 4x_2$$

subject to

$$-4x_1 + 3x_2 \geq -10$$

$$8x_1 - 10x_2 \leq 80$$

$$x_1, x_2 \geq 0$$

5. To solve the given linear programming problem answer the following questions:

Maximize $W = x_1 - 12x_2 + 4x_3$

Subject to

$$4x_1 + 3x_2 - x_3 \le 1$$
$$x_1 + x_2 - x_3 \ge -2$$
$$-x_1 + x_2 + x_3 \ge -1$$
$$x_1, x_2, x_3 \ge 0$$

a. Write the Initial Simplex Table.

b. Write the second simplex table.

c. What is the pivot element in the second table?

d. What is the entering variable in the next table?

e. Write the final table.

f. What is the maximum value of the objective function and at what values of $x_1, x_2, and\ x_3$?

6. Because of increased business, a catering service finds that it must rent additional delivery trucks. The minimum needs are 12 units each of refrigerated and nonrefrigerated space. Two standard types of trucks are available in the rental market. Type A has 2 units of refrigerated space and 1 unit of nonrefrigerated space. Type B has 2 units of refrigerated space and 3 unit of nonrefrigerated space. The costs per mile are $0.40 for A and $0.60 for B. Use the dual and the simplex method to find the minimum total cost per mile and the number of each type of truck needed to attain it.