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

MATH 131: FINITE MTHEMATICS

Semester 152
Major Exam Two
Wednesday, March 30, 2016
Allowed time 90 minutes

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	4+3	
Q2	7	
Q3	5+4	
Q4	7	
Q5	4	
Q6	10	
Q7	16	
Total	60	

1. A car dealership offered an installment plan to buy a popular model of the car as making a down payment of 20,000 riyals and 2000 riyals per month for three years with interest charged at 12 percent per year compounded monthly on the unpaid balance.

a. What was the original cost of the car? (4 points).

b. What portion of the total car payments went toward interest charges? (3 points).

2. A debt of $4500 due in four years and $ 6000 due in six years is to be repaid by a single payment of $2000 now and three equal payments that are due each consecutive year from now. If the interest rate 7% compounded annually, how much are each of the payments? (7 points).

3.

a. On March 1, 1996, Mr. Jackson invested $ 10,000 in a 10-year certificate of deposit that paid interest at the annual rate of 4% compounded continuously .When the certificate matured on March 1,2006, he reinvested the entire accumulated amount in corporate bonds, which earn interest at the rate of 5% compounded annually. To the nearest dollar, what will be Mr. Jackson's accumulated amount on March 1, 2014. (5 points).

b. If Mr. Jackson had made a single investment of $10,000 in 1999 that mature in 2015 and has an effective rate of interest of 4.5%, would her accumulated amount be more or less than that in part(a) and by how much (to the nearest dollar)? (4 points).

4. In 10 years, a $50,000 machine will have a salvage value of $5000. A new machine at that time is expected to sell for $53,000 .In order to provide funds for the difference between the replacement cost and the salvage value, a sinking fund is set up into which equal payments are placed at the end of each year. If the fund earns 8% compounded annually, how much should each payment be? (6 points).

5. Determine the dual problem only (do not solve) of the linear programming problem. (4 points).

Minimize $Z = 3x_1 + 4x_2 + 5x_3$

Subject to $-x_1 + 3x_2 - 4x_3 \leq -2$

$-x_1 + 2x_2 + 5x_3 \geq 4$

$x_1,\ x_2,\ x_3 \geq 0$

6. A manufacture produces computer chips for two companies: HP and DELL. During production, the chips require the use of two machines, A and B. The number of hours needed on both machines are indicated in the following table:

	Machine A	**Machine B**
HP	**4 hours**	**6 hours**
DELL	**2 hours**	**4 hours**

If machine A can be used 15 hours a day & machine B can be used 24 hours a day, and the profits on the HP and DELL models are $36 and $40, respectively, how many of each type of chips should be made per day to obtain maximum profit? What is the maximum profit? (You have to use Geometric Method). (10 points)

7. Suppose a company manufactures different electronic components for computers. Component A requires 2 hours of fabrication and 1 hour of assembly; component B requires 3hours of fabrication and 1 hour of assembly; and component C requires 2 hour of fabrication and 2 hours of assembly. The company has up to 1,000 labor hours for fabrication and 800 labor hours of assembly times, each week. If the profit on each component A, B, and C is $7, $8, and $10 respectively. How many of each should be produced to maximize the profit? Solve by answering the following questions.

1. Set up the problem (2 points).

2. Write the Initial simplex table (2 points).

3. What is the pivot element in the initial simplex table? (1 point).

4. Write the second simplex table (4 points).

5. What is the pivot element in the second simplex table (2 points)?

6. What is the maximum profit? (4 points).

7. How many of each should be produced to get the maximum profit? (1 point)