



Prince Sultan University
Department of Mathematical Sciences

Major II Exam
Semester I, 2007 FALL (071)
28th November, 2007

A

MATH 101 – Finite Mathematics

Time Allowed : 120 minutes
Maximum Points: 100 points

Mr. Khaled Naseralla

Name of the student: _____

ID number : _____

Section : _____

Question	Maximum score	Your Score
Q.1	10	
Q.2	6	
Q.3	8	
Q.4	8	
Q.5	12	
Q.6	8	
Q.7	12	
Q.8	12	
Q.9	16	
Q.10	8	
Total	100	

Q.1(10 points): Write True or False for each of the following statements.

- 1) An account that pays 8% interest compounded semiannually is better than an account that pays 8% compounded quarterly. _____
- 2) An investment of \$1,000 at 5% compounded annually for 1-year produces the same interest as an investment of \$1,000 at 5% simple interest for 1-year. _____
- 3) If an investment pays interest at an annual rate of 5% per year, compounded twice a year, then the effective rate is larger than 5%. _____
- 4) Shortening the period of a loan lowers the monthly payments. _____
- 5) Some LP problem have no solution. _____
- 6) The graphical method is practical for all LP problems. _____
- 7) If a linear programming problem has a solution, it is located at the center of the set of feasible points. _____
- 8) In a linear programming problem, there may be more than one point that maximizes or minimizes the objective function. _____
- 9) The point (8,8) is in the solution set of the system of inequalities.
 $8x - 2y > 16$
 $2x - 9y \leq -18$ _____
- 10) The effective rate for an account that pays 6% interest compounded monthly is 6.17%. _____

Q.2(6 points): Determine without graphing which of the points $P_1(8,6)$, $P_2(2,-5)$, and $P_3(4,1)$ is(are) part of the graph of the following system:

$$\begin{aligned} 5x - y &\geq 2 \\ x - 4y &\leq -2 \end{aligned}$$

Q.3(8 points): Dr. Steve is saving money to send his children to college. How much will he need to invest now at 8% compounded quarterly if he wants the accumulated value of the investment to be \$24,000 in 10 years?

Q.4(8 points): If the cost of living is expected to increase at the rate of 3% compounded annually each year for the next 5 years. What will the cost then be of goods priced at \$50 now?

Q.5(12 points): (i) Dan needs to borrow \$15,000 for a new machine for his auto repair shop. He obtains a 2-year discounted loan at 12% interest. How much must he repay to settle his debt?

(ii) If Dan was offered a simple interest loan of \$15,000 at 14% for 2-years. Would this be a better offer than the discounted loan? Explain your answer.

Q.6(8 points): The Pirerra's are saving up for their trip to Europe. They deposit \$150 at the end of each month for 3 years, into an account which earns 9% compounded monthly. How much will this account contain at the end of the 3rd year?

Q.7(12 points): Use *the geometric approach (Graphing)* to solve the following linear programming problem

Minimize $Z = 3x + 6y$ subject to the following constraints:

$$x + 4y \geq 20$$

$$2x + 3y \geq 30$$

$$x \geq 0, y \geq 0$$

Q.8(12 points): Use the simplex method to solve the following linear programming problem.

Maximize $P = 2x_1 + x_2 + 3x_3$ subject to the following constraints:

$$x_1 + x_2 + x_3 \leq 10$$

$$x_2 + x_3 \leq 4$$

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

Q.9(16 points): Consider the following linear programming problem.

Minimize $C = 4x_1 + 2x_2$ subject to the following constraints:

$$x_1 + 2x_2 \geq 4$$

$$x_1 + 4x_2 \geq 6$$

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

(i) minimize C using the Duality Principle.

(ii) minimize C using the method of mixed constraints.

Q.10(8 points): A company makes two models of hair dryers, model Q and model R . Each Q model requires 10 minutes to be assembled while model R requires 20 minutes. It takes 4 minutes to pack model Q while model R takes 2 minutes to pack. The company finds that there are no more than 4 hours per day for assembly and no more than 1 hour for packing. (1 hour = 60 minutes)
If the company makes a \$2 profit on each model Q sold and a \$3 profit on each model R sold.

- (i) Write the linear programming system that maximizes the profit showing the objective function and the constraints.
- (ii) Solve the system using any appropriate method.