Prince Sultan University

Department of Mathematical Sciences

Major II Exam

Semester I, 2008 FALL (081)

MATH 101 – Finite Mathematics

Time Allowed : 120 minutes
Maximum Points: 100 points

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.** _____

$$8x - 2y > 16$$
$$2x - 9y \le -18$$

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:**

$$5x - y \ge 2$$
$$x - 4y \le -2$$

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 3^{rd} 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.