

PRINCE SULTAN UNIVERSITY**MATH 101****Finite Mathematics****MAJOR EXAM 2****16th May 2009****Time allowed: 120 minutes****Name:** _____**I.D.** _____**Instructors Name:** _____**Section:** _____

1. Answer all questions
2. This exam consists of 1 Cover Sheet & 7 Question Sheets with 11 questions.
3. You can use a calculator, **NOT** a mobile phone.
4. No talking during the test.
5. **Show all working out in the space provided.**

Question No.	Max. Points	Points Scored
1	10	
2	10	
3	8	
4	13	
5	13	
6	15	
7	6	
8	6	
9	6	
10	7	
11	6	
TOTAL SCORE	100	

Q1 [10 points] Write True (*T*) or False (*F*) for each of the following statements:

1) Investing at 8% compounded continuously is better than investing at 8% compounded daily. _____

2) The number of deposits for an ordinary annuity at 10% compounded semiannually in a period of 20 years is 10 deposits. _____

3) The LP maximum problem: Maximize $P = 3x_1 - 2x_2$

$$\text{subject to the constraints } \begin{cases} x_1 + 3 \geq x_2 \\ 2x_1 + x_2 \leq 4 \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$$

can be modified to become in standard form. _____

4) The solution of the LP problem that has the Simplex tableau

$$\begin{array}{cccccc|c} P & x_1 & x_2 & s_1 & s_2 & RHS \\ \hline 0 & 0 & 3 & 1 & 1 & 4 \\ 0 & 1 & 1 & 0 & 1 & 4 \\ \hline 1 & 0 & 2 & 0 & 1 & 10 \end{array}$$

is $P_{\max} = 10, x_1 = 4, x_2 = 4$. _____

5) The objective function $z = 2x + y$, subject to the constraints $\begin{cases} x + y \geq 2 \\ x \geq 0, y \geq 0 \end{cases}$, has a maximum value 4. _____

Q2 [10 points] Circle the correct answer:

1) Which of the following points is in the solution set of the system of inequalities $\begin{cases} 2x + y \leq 6 \\ x - 2y \geq 2 \end{cases}$

(a) (0, 4) (b) (2, 3) (c) (3, -1) (d) (5, 1)

2) How much interest will be due on a \$2000 loan at 15% annual simple interest at the end of 18 months?

(a) \$2450 (b) \$450 (c) \$600 (d) \$2600

3) The pivot element in the following tableau is located in:

$$\begin{array}{cccccc|c} 0 & 2 & -1 & 1 & 0 & -4 \\ 0 & 1 & 3 & 0 & 1 & 1 \\ \hline 1 & -1 & -2 & 0 & 0 & 0 \end{array}$$

(a) row 1, column 2 (b) row 1, column 3 (c) row 2, column 2 (d) row 2, column 3

4) The following tableau:

$$\begin{array}{c|ccccc|c}
 & P & x_1 & x_2 & s_1 & s_2 & RHS \\
 s_1 & 0 & 0 & 0 & 1 & 1 & 40 \\
 x_1 & 0 & 1 & -1 & 0 & 1 & 20 \\
 \hline
 P & 1 & 0 & -2 & 0 & 1 & 20
 \end{array}$$

(a) is an initial tableau

(b) is a final tableau

(c) requires additional pivoting

(d) indicates no solution

5) If a minimum problem in standard form has been solved by the Duality Principle and the final

tableau obtained is
$$\begin{array}{ccccc|c}
 0 & 2 & 1 & 1 & 0 & 2 \\
 0 & -1 & 0 & -1 & 1 & 1 \\
 \hline
 1 & 4 & 0 & 2 & 0 & 10
 \end{array}$$
, then the solution for the minimum problem is

(a) min. value = 10, when $x_1 = 2$ and $x_2 = 0$

(b) min. value = 10, when $x_1 = 0$ and $x_2 = 2$

(c) min. value = -10, when $x_1 = 0$ and $x_2 = 2$

(d) min. value = 10, when $x_1 = 2$ and $x_2 = 1$

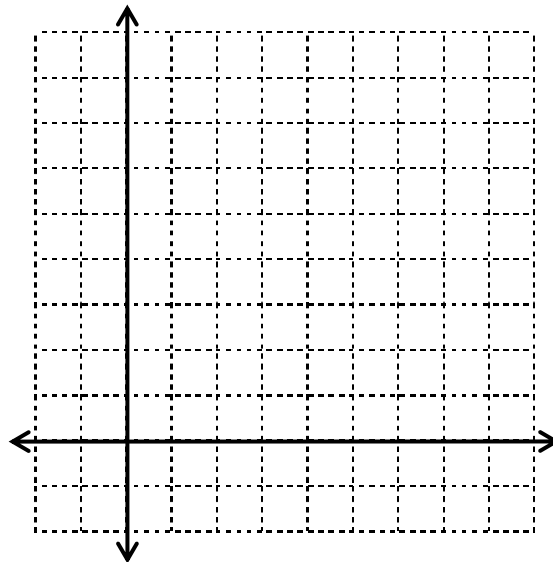
Q3 [8 points] Find the **dual maximum problem** for the following minimum problem (**Do not solve**):

Minimize: $C = 2x_1 + x_2 + 3x_3$

Subject to the constraints
$$\begin{cases} x_1 + 3x_2 + x_3 \geq 10 \\ 2x_1 + x_2 + 5x_3 \leq 20 \\ x_1 \geq 0, x_2 \geq 0, x_3 \geq 0 \end{cases}$$

Q4 [13 points] Use the **geometric approach** to find the maximum and minimum values of the objective function: $z = 2x + 3y$

Subject to the constraints
$$\begin{cases} x + y \geq 4 \\ 3x + y \leq 6 \\ x \geq 0, y \geq 0 \end{cases}$$



Q5 [13 points] Use the **Simplex method** to solve the following LP problem:

Maximize: $P = 2x_1 + 5x_2 + 2x_3$

Subject to the constraints
$$\begin{cases} x_1 + 3x_2 + 3x_3 \leq 12 \\ 2x_1 + 4x_2 + 2x_3 \leq 20 \\ x_1 \geq 0, x_2 \geq 0, x_3 \geq 0 \end{cases}$$

Q6 [15 points] Use the **Mixed-Constraints method** to solve the following LP problem:

Minimize: $z = 2x_1 + x_2$

Subject to the constraints
$$\begin{cases} 2x_1 + 4x_2 \geq 8 \\ x_1 + 3x_2 \leq 5 \\ x_1 \geq 0, x_2 \geq 0 \end{cases}$$

Q7 [6 points] If a bank pays 5% simple interest, how much should be deposited now to get \$2000 after 5 years?

Q8 [6 points] Find the proceeds for a discounted loan of \$2000 repaid in 2 years at a rate of 8%.

Q9 [6 points] If \$20,000 are invested in an account that pays 6% compounded monthly, how much is in the account after 6 months?

Q10 [7 points] How long will it take \$4,000 to grow to \$10,000 if it is invested at 7% compounded continuously? (Round your answer to the nearest year)

Q11 [6 points] Todd and Tami pay \$300 every 3 months into an ordinary annuity paying 8% compounded quarterly. What is the value of the annuity after 24 deposits?