Prince Sultan University

Department of Mathematical Sciences

Major I Exam

Semester II, 2008 Fall (072)

29 March 2008

A

MATH 101 – Finite Mathematics

Time Allowed : 90 minutes
Maximum Points: 100 points

Name of the student:_____

ID number :_____

Section : _____ **Instructor's Name:** _____

Question	Maximum score	Your Score
Q.1	8	
Q.2	12	
Q.3	8	
Q.4	8	
Q.5	10	
Q.6	8	
Q.7	10	
Q.8	8	
Q.9	10	
Q.10	8	
Q.11	10	
Total	**100**	

Q.1(8 points) ***Write True(T) or False(F) for each of the following statements.***

1) The system of equations of two coincident lines has infinity solutions. _____

2) A square matrix will always have an inverse. _____

3) $\begin{bmatrix} 5 & 8 \\ 3 & 5 \end{bmatrix}$ and $\begin{bmatrix} 5 & -8 \\ -3 & 5 \end{bmatrix}$ are inverses of each other. _____

4) If A is 3×4 and B is 3×4 , then $AB = BA$ _____

5) Two matrices can always be multiplied as long as they are each square matrices. _____

6) The matrix $\left[\begin{array}{cc|c} 1 & 3 & -2 \\ 0 & 1 & 5 \\ 0 & 0 & 0 \end{array}\right]$ is in Row Echelon Form. _____

7) A system of two linear equations containing two variables sometimes has no solution. _____

8) An increase in price usually cause an increase in supply and decrease in demand. _____

Q.2(12 points) ***Circle the correct answer.***

1) Find an equation of the line which goes through $(2,3)$ and is parallel to the line $9x+3y=1$:

(a) $3x-y=3$ (b) $3x+y=9$ (c) $3x+y=1$ (d) $2x+y=7$

2) The point of intersection for the two lines: $2x+3y=18$ and $x-y=4$ is:

(a) $(2,6)$ (b) $(3,-1)$ (c) $(5,1)$ (d) $(6,2)$

3) The equation that describes a line with $y-\text{int}\,ercept\ -2$ and slope $\frac{4}{3}$ is:

(a) $3x+4y=6$ (b) $4x-3y=6$ (c) $4x-3y=2$ (d) $3x-4y=6$

4) For the following augmented matrix, determine which of the following statements is true about the associated system of linear equations:

$$\left[\begin{array}{ccc|c} 1 & 3 & 0 & 7 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 0 & 0 \end{array}\right]$$

(a) The system has no solution. (b) The system has exactly one solution.

(c) The system has exactly two solutions. (d) The system has infinitely many solutions.

5) Find x , y , and z so that

$$\begin{bmatrix} x-2 & 2 & 2z \\ 6y & x & 2y \end{bmatrix} = \begin{bmatrix} y & z & 6 \\ 18z & y+2 & 6z \end{bmatrix}$$

(a) $x=2,\ y=0, z=2$ (b) $x=4,\ y=6, z=2$ (c) $x=6,\ y=4, z=2$ (d) $x=8,\ y=6, z=2$

6) The slope of the line $5x+3y=9$ is:

(a) -5 (b) $\frac{5}{3}$ (c) $-\frac{5}{3}$ (d) 5

7) If A is a 2×3 matrix, B is a $4\times2, C$ is a 3×4, and D is 4×3 matrix. Which of the following operations is defined?

(a) $2A+D$ (b) $CB+A$ (c) $BA+5D$ (d) $AD+D$

8) Find the product $A.B$ given that $A=\begin{bmatrix} 5 & 3 & 6 \\ 1 & 1 & 3 \end{bmatrix}$ and $B=\begin{bmatrix} 3 & 3 \\ 6 & 4 \\ 4 & -3 \end{bmatrix}$

(a) $\begin{bmatrix} 8 & 6 & 12 \\ 5 & 5 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 57 & 9 \\ 21 & -2 \end{bmatrix}$ (c) $\begin{bmatrix} 5 & 0 \\ 8 & 6 \end{bmatrix}$ (d) $\begin{bmatrix} 3 & 3 \\ 6 & 4 \\ 4 & -3 \end{bmatrix}$

Q.3(8 points) **Given that** $A=\begin{bmatrix} 5 & 4 \\ 1 & 8 \\ 3 & -1 \end{bmatrix}$, $B=\begin{bmatrix} 1 & 2 & -3 \\ 4 & 5 & 0 \\ -2 & 6 & -1 \end{bmatrix}$, and $C=\begin{bmatrix} 3 & -4 \\ 1 & 5 \\ 5 & -2 \end{bmatrix}$

(i) Find $B.(A-C)$

(ii) Find $3B+I_3$

Q.4(8 points) **Consider the following pair of lines:**

$$L: 2x - 4y = -8$$

$$M: 3x + 6y = 0$$

(i) Are the two lines parallel, intersecting, or coincident? Give the reason.

(ii) Find the point(s) of intersection, if any.

Q.5(10 points) **Find an equation of the line with the given conditions:**

(i) passes through $(4, 0)$ and $(8, 5)$

(ii) parallel to the line $x + y = 2$ and containing the point $(1, -3)$

Q.6(8 points) **The supply and demand equations for a certain product are given below:**

$$S = 4p + 200 \quad ; \quad D = -3p + 480$$

(i) Find the market price

(ii) How many items of the product are sold at the market price

Q.7(10 points) **Consider the following system of linear equations:**

$$2x - y - z = 0$$
$$x - y + z = 1$$
$$3x - y = 2$$

(i) Write the augmented matrix for system

(ii) Use the row operations to change the augmented matrix into a Reduced Row Echelon Form $(RREF)$

(iii) Is the system consistent or inconsistent?

(iv) Give the solution of the system, if any.

Q.8(8 points) **Solve the following system of linear equations(Use any appropriate method)**

$$2x + 4y + 10z = -2$$
$$y - 3z = 7$$
$$x + 3y + 6z = -2$$

Q.9(10 points) (i) Find the inverse of the augmented matrix that represents the coefficients of the variables of the following system of linear equations:

(ii) Use the inverse of a matrix to solve the system

$$2x + y - z = 7$$
$$x + y - z = 4$$
$$-x - 2y + 3z = -2$$

Q.10(8 points) 500 passengers rode a train one morning. If an adult ticket costs 75 *Riyals* and the child's ticket costs 35 *Riyals* and 32,500 *Riyals* of revenue was produced, how many children rode the train? How many adults?

Q.11(10 points) A manufacturer can sell a certain product for $110 per item. Total cost consists of a fixed overhead of $75,000 plus production costs of $60 per item.

(i) How many items must the manufacturer sell to break even?
(ii) What is the manufacturer's profit or loss if 1,000 items are sold?
(iii) How many items must be sold for the manufacturer to make a profit of $12,500?