

Prince Sultan University
Department of Mathematics and Physical Sciences

Major I Exam

Semester II, 2008-2009 Spring (082)

04 April 2009

MATH 101 – Finite Mathematics

Time Allowed : 100 minutes

Student Name:

Section:

ID Number:

Instructor's Name:

Important Instructions:

1. Y
You may use a scientific calculator that does not have programming or graphing capabilities.
2. Y
You may not borrow a calculator from anyone.
3. Y
You may not use notes or any textbook.
4. T
There should be no talking during the examination.
5. Y
Your exam will be taken immediately if your mobile phone is heard.

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

6. Looking around or making an attempt to cheat will result in your exam being cancelled.

7. This exam has 10 problems, some with several parts and a total of 7 pages. Make sure your papers have all these problems.

Q.1 (10 points)

- i. Find the equation of the line with slope -3 and y-intercept -2 .
- ii. Find the equation of the line parallel to $2x - y = -2$ and containing the point $(1,1)$.

Q.2 (10 points) Determine whether the given pair of lines are parallel, coincidental or intersecting:

i.
$$\begin{cases} L : x - y = 5 \\ M : -2x + 2y = -10 \end{cases}$$

ii.
$$\begin{cases} L : 4x + 2y = 4 \\ M : 4x - 2y = 4 \end{cases}$$

Q.3 (10 points) In year 2003, the cost of a compact car averaged \$14,500. In year 2006, the cost of a compact car averaged \$15,450.

- i. Assuming that the relationship between time and cost is linear, develop a formula for predicting the average cost of a compact in the future.

- ii. What do you predict the average cost of a compact will be in 2009?

Q.4 (10 points) The supply and demand equations for sugar have been estimated to be given by the equations

$$S = 0.7p + 0.4 \quad \text{and} \quad D = -0.5p + 1.6$$

where p is the price in dollars per pound and S and D are in millions of pounds.

- i. Find the market price.

- ii. What quantity of sugar is demanded at this market price.

Q.5 (8 points) For $A = \begin{bmatrix} 2 & -3 & 4 \\ 0 & 2 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 1 & -2 & 0 \\ 5 & 1 & 2 \end{bmatrix}$ and $C = \begin{bmatrix} -3 & 0 & 5 \\ 2 & 1 & 3 \end{bmatrix}$. Find $3A + 4(B - C)$.

Q.6 (12 points) For \$1.79 per copy, the *Chicago Tribune* will deliver the Sunday newspaper to your front door. The cost to the *Tribune* for Sunday home delivery is approximately \$1.13 per newspaper with fixed costs of \$1,252,000.

- i. Determine the revenue R from delivering x newspapers.
- ii. Determine the cost C of delivering x newspapers.
- iii. Determine the profit P of delivering x newspapers.
- iv. Determine the break-even point.

Q.7 (10 points)

$$\left[\begin{array}{ccc|c} 1 & -3 & 4 & 3 \\ 0 & 2 & -4 & 2 \\ 0 & -6 & 12 & -6 \end{array} \right]$$

is the *augmented matrix* of a system of

linear equations.

- ii. Determine whether the system is *consistent* or *inconsistent*. If it is *consistent*, write the solution set.

Q.8 (10 points)

i. Find x and y such that
$$\begin{bmatrix} 3 & -2 & 2 \\ 1 & 0 & -1 \end{bmatrix} + \begin{bmatrix} x-y & 2 & -2 \\ 4 & x & 6 \end{bmatrix} = \begin{bmatrix} 6 & 0 & 0 \\ 5 & 2x+y & 5 \end{bmatrix}.$$

ii. Find the product
$$\begin{bmatrix} 1 & -2 & 3 \\ 4 & 0 & 6 \end{bmatrix} \cdot \begin{bmatrix} 0 & -2 \\ 1 & 0 \\ 2 & -4 \end{bmatrix}.$$

Q.9 (8 points) Solve the system of equations $\begin{cases} 2x+y=1 \\ 4x+2y=3 \end{cases}$. If the system has no solution, say it is *inconsistent*.

Q.10 (12 points)

- i. Find the inverse of $\begin{bmatrix} 1 & 3 & 2 \\ 2 & 7 & 3 \\ 1 & 0 & 6 \end{bmatrix}$.

- ii. Use the inverse to solve the following system $\begin{cases} x + 3y + 2z = 1 \\ 2x + 7y + 3z = 2. \\ x + 6z = 3 \end{cases}$