Prince Sultan University

Department of Mathematical Sciences

Major I Exam

Semester I, 2013 FALL (131)

October 08, 2013

MATH 101 – Finite Mathematics

Time Allowed : 50 minutes
Maximum Points: 50 points

Name of the student:_____

ID number :_____

Section : _____

Important Instructions:

1. You may use a scientific calculator that does not have programming or graphing capabilities.
2. You may NOT borrow a calculator from anyone.
3. You may NOT use notes or any textbook.
4. There should be NO talking during the examination.
5. Your exam will be taken immediately if your mobile phone is seen or heard
6. Looking around or making an attempt to cheat will result in your exam being cancelled
7. This examination has 6 problems, some with several parts and a total of 4 pages. Make sure your paper has all these problems.

Question	Maximum score	Your Score
Q.1 , Q.2	20	
Q.3 , Q.4 , Q.5	20	
Q.6	10	
Total	**50**	

Q.1 (15 points) A computer company is planning to introduce a new calculator. The company estimates that its fixed costs to set up the production line will be $\$100,000$. The company also estimates that the direct costs for making each calculator will be $\$50$ each. The company expects to sell the calculators for $\$75$ each.

(i) Determine the revenue R from selling x calculators.

(ii) Determine the cost C of producing x calculators.

(iii) Determine the profit P from selling x calculators.

(iv) How many calculators must be sold to break-even?

(v) **Graph** the cost function, revenue function, and profit function on the same axes.

(vi) Find the marginal cost.

(vii) Find the average cost of producing $5,000$ calculators.

(viii) How many calculators should be sold for the company to achieve a profit of $\$20,000$?

Q.2 (5 points) State the solution of the system of linear equations represented by the following augmented matrix in terms of z $(\text{the free variable})$

$$\left[\begin{array}{ccc|c} 1 & 0 & 2 & -2 \\ 0 & 1 & 6 & -9 \end{array}\right]$$

Q.3 (8 points) Find an equation **(in point-slope form, slope-intercept form, and in general form)** for the line parallel to the line $4x-9y=2$ and passing through the point $(3,-4)$.

Q.4 (6 points) Use the matrices below to perform the indicated operation, if possible

$$A=\begin{bmatrix}2 & 3\\ 1 & -4\end{bmatrix} \quad \text{and} \quad B=\begin{bmatrix}1 & -2 & 3\\ -1 & 4 & -2\end{bmatrix}$$

$$A.B+3I_2.B+A^2$$

Q.5 (6 points) State University had an enrollment 0f $12,000$ in year 2000 and an enrollment of $15,900$ in year 2006

(i) Find a linear function that gives the enrollment of State University in any year.

(ii) Use the linear function above to find the expected enrollment of the University in year 2011.

Q.6 (10 points) A company produces three types of TV sets; deluxe, super-deluxe, and ultra. Each deluxe set requires 2 hours of electronics work, 1 hours of assembly time, and 1 hour of finishing time. Each super-deluxe requires 2 hour of electronics, 2 hour of assembly, and 3 hour of finishing time. Each ultra requires 1 hour of electronics, 1 hour of assembly, and 1 hour of finishing time. There are 140 hours available for electronics, 100 hours available for assembly, and 110 hours available for finishing per week. How many of each model should be produced each week if all available time is to be used?

You may use Gauss-Jordan Elimination OR the inverse of the coefficient matrix to solve the problem (NOT BOTH).