PRINCE SULTAN UNIVERSITY

MATH 101 FINITE MATHS

MAJOR EXAM 1   3RD NOVEMBER 2012

Time Allowed: 1 hour 30 mins.

Name :

I.D.:

Section:

1. Answer all questions.
2. This exam consists of 5 pages including this cover sheet.
3. There are 9 questions. CHECK YOU HAVE ALL THE QUESTIONS.
4. You can use a calculator, NOT a mobile phone.
5. Show all working out in the space provided. If you use the back of a page indicate this on the front.

Question No.	Max. Points	Points Scored
1,2,3	18	
4,5	14	
6,7	16	
8,9	12	
TOTAL	60	
TOTAL	20	

Q1. [4 pts.] Let p be the price in dollars of a particular item and $S(p) = 15\left(40 - \dfrac{p^2}{10}\right)$ be the number sold. Find the domain of this function and sketch its graph throughout the domain (use at least 5 points).

Q2. [6 pts.] Find the equation of a line (**in all three forms**) passing through $(2, \frac{1}{2})$ and parallel to the line $\frac{3}{4}x - 2y = 7$.

Q3. [8 pts.] A printing press costs $43,000 when purchased new. After 14 years it has a salvage value of $8,000. Straight line depreciation is applied to the net value of the machine over the 14 year period.

a) Find the annual depreciation.

b) Find a linear function that represents the Book Value of the machine during its lifetime.

c) Graph the function.

d) Using this model find the Book Value after 8 years.

Q4. [4 pts.] Solve the system using **addition/elimination** method $\begin{cases} 1.8x + 3.5y = 167 \\ 2x + 3y = 150 \end{cases}$

Q5. [10 pts.] A company that manufactures calculators has found that it has fixed costs of $1800 per day and it can produce calculators at $10 per piece. It has also found that it can sell each calculator for $40.

a) Find the Cost, Revenue and Profit functions.

b) Draw the Cost, Revenue and Profit function on the same axes. Find the break-even point.

c) If the company makes 75 calculators a day, is it making a profit or a loss?

d) Find the average cost of making 40 calculators.

e) If 2,500 calculators are produced, find the marginal cost.

Q6. [10 pts.] A car factory produces three types of cars; hatchback, saloon and SUV. The factory must sell a total of 20 cars each week to meet production schedules.

For painting, the cars are sent to the paint shop where the following times are required for each type of car: hatchback, 4 hours; saloon, 3 hours; and SUV, 6 hours. The paint shop can handle a maximum of 74 hours each week.

For assembly each hatchback requires 16 hours, each saloon requires 48 hours, each SUV requires 64 hours. A total of 848 hours are available for assembly each week.

How many of each type of car does the factory need to produce?

Q7. [6 pts.] Find the solution to the system of linear equations whose reduced-row-echelon form is given by the following matrices, where a solution exists express it in terms of z.

a) $\begin{bmatrix} 1 & 0 & \frac{4}{5} & 1 \\ 0 & 1 & -\frac{2}{5} & -1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$

b) $\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 3 & 2 \\ 0 & 0 & 0 & -5 \end{bmatrix}$

Q8. [6 pts.] Given that $A = \begin{bmatrix} 2 & 1 \\ -3 & 5 \\ 1 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -4 \\ -1 & 2 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & -2 \\ 0 & 2 \end{bmatrix}$,

a)   Find AB

b)   Find $3C^2 + B^{-1}$

c)   Solve for X in the equation $B = \frac{3}{4}X + 2C$

Q9. [6 pts.] Use the inverse of the co-efficient matrix A^{-1} to solve: $\quad \begin{aligned} x + y + 2z &= 5 \\ y - z &= 1 \\ 2y - z &= 3 \end{aligned}$