PRINCE SULTAN UNIVERSITY

MATH 101 FINITE MATHS

FINAL EXAM 15TH JUNE 2010

Time Allowed: 2½ hours (150 mins)

Name: _____

I.D.: _____

Section: **Circle one** **9.00am** **10.00a.m.** **11.00am**

1. Answer all questions.
2. This exam consists of 8 pages including this cover sheet.
3. There are 17 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	14	
4,5	18	
6,7,8	18	
9,10.11,12	16	
13,14,15	16	
16,17	16	
TOTAL	100	
TOTAL	40	

1) [6 points] The supply and demand equations for a certain commodity have been estimated as being given by:

$$S = 6p + 5 \qquad\qquad D = -2p + 35$$

Where p is measured in dollars and S and D are measured in kilograms.

a) Find the supply and demand when the price is $10.

b) Find the market price of the commodity.

c) Graph the supply and demand equations showing clearly the points you have found in parts (a) and (b).

2) [4 points] A man rents a car for a fixed daily rental cost of $35 plus $0.55 per mile. Write an equation to show the relationship between C (total daily cost) and x (miles driven daily). Find the daily cost for driving 260 miles.

3) [4 points] Use the **Gauss-Jordan** Elimination to solve the system.

$$\begin{aligned} x - y + z &= 8 \\ 2x + 3y - z &= -2 \\ 3x - 2y - 9z &= 9 \end{aligned}$$

4) [6 points] Use a graph to find the maximum and minimum values of the objective function $z = 5x + 7y$, subject to the following constraints $\begin{cases} x + 3y \le 12 \\ x + y \le 8 \\ x \ge 0, y \ge 0 \end{cases}$

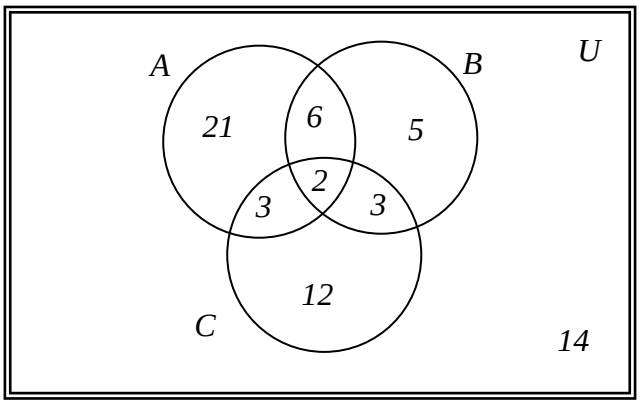
5) [12 points] Minimize $C = 2x_1 + 3x_2 + 4x_3$ using the Duality Principle,

$$\begin{aligned} & x_1 - 2x_2 - 3x_3 \ge -2 \\ \text{subject to constraints} \quad & x_1 + x_2 + x_3 \ge 2 \\ & 2x_1 + x_3 \ge 3 \end{aligned}$$

$$x_1 \ge 0 \quad x_2 \ge 0 \quad x_3 \ge 0$$

6) [6 points] The number of LCD TV's sold by Samsung Inc. is growing exponentially. In 2005 the company sold four million sets. In 2010 the number of TV's sold was seven and a half million. If this exponential trend continues how many will be sold in 2011?

7) [6 points] Use the data in the figure to answer the following questions:



How many elements are in:

a) Set B

b) A or B

c) B but not A

d) Not A nor B

e) A and C but not B

f) Neither A nor B nor C

8) [6 points] Use the Binomial theorem to **fully** expand $\left(3x^2+2y\right)^4$.

9) [4 points] Find the purchasing power of $3000 after 5 years given that the rate of inflation averages 5.5% per year.

10) [4 points] In how many ways can a committee consisting of three faculty members, two administrators and four students be formed if six faculty members, four administrators and thirty five students are eligible to serve on the committee?

11) [4 points] Find the number of ways of selecting 3 summer courses from university schedule containing 55 courses.

12) [4 points] In the experiment of drawing a card from a regular deck of 52 cards. Find the probability that:

a) The 10 of diamonds (10♦) is drawn.

b) A heart ♥ is drawn.

c) A picture card (J,Q,K) is drawn.

d) The card that is drawn is not a picture card.

13) [4 points] In a study of the number of cars owned by the residents of a certain community the following probability table was constructed:

Number of Cars	**0**	**1**	**2**	**3**	**4**	**5 or more**
Probability	0.14	0.42	0.18	0.11	0.09	0.06

Find the probability of owning:

a) 2 or 3 cars

c) More than 3 cars

b) At least 1 car

d) Not even 1 car

14) [6 points] A box contains six white, ten yellow and four green balls. Four balls are picked at a time without replacing any ball before the next is picked. Find the probability that one white, one yellow and two green balls are drawn.

15) [8 points] Due to a mix up on the production plant 38 good laptops were shipped out with 6 defective ones. A certain store receives three laptops at random.

a) What is the probability that the store receives all three defective laptops?

b) What is the probability that **at least** one laptop is defective?

c) What is the probability that none of the laptops are defective?

15) [8 points] Consider a three-child family.

a) Write the sample space *S*, showing all the possible ways these children could occur.

b) Let *E* be the event: "the family has exactly one girl." Write down all the possible outcomes.

c) Let *F* be the event "the first child is a boy.' Write down all the possible outcomes.

d) Find the probability that the family has one girl, given the first child is a boy.

16) [8 points] If $P(E) = 0.25$ and $P(F) = 0.32$ and $P(E \cap F) = 0.15$, find the following probabilities:

a) $P(E \cup F)$

b) $P(E|F)$

c) $P(F|E)$

d) $P(\overline{E}|\overline{F})$