Prince Sultan University

Department of Mathematical Sciences

Final Exam

Semester I, 2010 FALL (101)
25th January, 2011
B

MATH 101 – Finite Mathematics

Time Allowed : $2\frac{1}{2}$ hours

Maximum Points: 100 points

Name of the student:	
ID number	**:**
Section	**:**
Instructor	**: Mr. Khaled Naseralla**

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 19 problems, some with several parts and a total of 8 pages. Make sure your paper has all these problems.

Question	Maximum score	Your Score
Q.1	10	
Q.2, Q.3, Q.4, Q.5	16	
Q.6, Q.7, Q.8, Q.9	17	
Q.10, Q.11, Q.12, Q.13	21	
Q.14, Q.15, Q16, Q.17	18	
Q.18	6	
Q.19	12	
Total	**100**	

40

Q.1 (10 points): Circle the correct answer.

1) If you deposit 10000 SR into an account that pays 5% simple interest per year, how much will you have in the account after 30 months?

(a) 15000 SR (b) 11250 SR (c) 11429 SR (d) 18750 SR

2) How many 5-letter words can be formed by rearranging the letters in the word " agree " ?

(a) 120 (b) 24 (c) 20 (d) 60

3) Find the market price for the following supply and demand equations: $\begin{cases} S = 14P - 6 \\ D = -2p + 42 \end{cases}$

where p is the price per unit in dollars.

(a) $p = \$1$ (b) $p = \$3$ (c) $p = \$2$ (d) $p = \$4$

4) There is a 50% chance of rain today and a 50% chance of rain tomorrow. Assuming independence, the chance of rain either today or tomorrow is:

(a) 75% (b) 50% (c) 25% (d) 100%

5) The lines $3x - 4y = 6$ and $2x + y = -5$ are:

(a) intersecting (b) coincident (c) parallel (d) can't be decided

6) If E and F are independent events, then $P(E/F)$

(a) $P(E).P(F)$ (b) 0 (c) $P(F)$ (d) $P(E)$

7) On how many ways can a $10-$question true-false test be answered?

(a) 100 (b) 90 (c) 1024 (d) 20

8) Find the break-even point for the cost C of production and the revenue R .

$C = 12x + 300$; $R = 22x$

(a) 3000 units (b) 9 units (c) 30 units (d) 23 units

9) If the probability that you will pass a test is 0.85. What are the odds against you passing the test?

(a) $17:3$ (b) $17:20$ (c) $20:17$ (d) $3:17$

10) In how many ways can a TV manager schedule 3 different commercials into 5 available time slots reserved for commercials?

(a) 120 (b) 15 (c) 60 (d) 10

Q.2 (4 points): A company manufactures printers with a fixed cost of $\$75000$ and a direct cost of $\$80$ for each printer.

(i) Write the linear cost function that gives the total cost for manufacturing x printers?

(ii) What is the total cost for manufacturing 150 printers?

Q.3 (4 points): The Supply equation for a certain commodity is given by the equation: $S = 40p + 300$
Find the Demand equation of the commodity if at price of $\$14$, the Demand is 600 units and that the market price is $\$12$.

Q.4 (4 points): Show that matrix $A = \begin{bmatrix} 4 & -2 \\ 6 & -3 \end{bmatrix}$ has no inverse.

Q.5 (4 points): Find the amount of money required to be invested in an account now to achieve an amount of $\$5000$ after 5 years with an interest rate of 6% compounded quarterly.

Q.6 (4 points): A company estimates that it will need a new forklift in six years. The estimated cost of the vehicle is $\$40000$. The company sets up a sinking fund that pays 8% compounded semiannually, into which it will make semiannual payments to achieve the goal. Calculate the amount of each payment.

Q.7 (4 points): Find the reduced row-echelon form (RREF) of matrix A using the row operations, then determine the solution set of the system represented by A.

$$A = \left[\begin{array}{ccc|c} 1 & 1 & 0 & 7 \\ 0 & 1 & -1 & 5 \\ 1 & -1 & 1 & 6 \end{array}\right]$$

Q.8 (5 points): A math class has a total of 50 students. 25 of them have dark hair, 15 have both dark hair and brown eyes, and 8 have neither dark hair nor brown eyes.

(i) How many students in the class have either dark hair or brown eyes?

(ii) How many students in the class have dark hair but don't have brown eyes?

(iii) Find the probability that a student in the class has brown eyes given that he has dark hair.

Q.9 (4 points): 15 students are going hiking on their spring break. They plan to travel in three vehicles. One vehicle seating 7 students, one seating 5, and one seating 3 students. In how many ways can the students group themselves for their trip?

Q.10 (4 points): In a shipment of 100 televisions, 6 are defective. If a person buys 5 televisions from that shipment, what is the probability that 2 of them are defective?

Q.11 (5 points): Use the table of probabilities to answer the following questions:

a) $P(B \cap E)$

b) $P(A/D)$

	A	B	C
D	0.1	0.08	0.02
E	0.4	0.32	0.08

c) Are events C and D independent? Explain.

Q.12 (8 points): The past records of 1000 drivers produced the following data on a driver being in an accident:

(i) Find the probability of a driver being in an Accident

(ii) Find the probability of an Accident, given Rain.

	Accident A	No Accident $\overline{A}$
Rain, R	25	335
No Rain, $\overline{R}$	15	625

(iii) Find the probability of an Accident or No Rain.

(iv) Are the events" having an Accident" and "Rain" independent? Show how
Explain what your answer means.

Q.13 (4 points): Seven juniors and five senior students are present at a meeting. In how many ways can a committee of 3 be selected consisting of at least 2 juniors?

Q.14 (6 points): A seed company claims that 80% of its bean seeds will germinate. If 10 of these seeds are planted in warm, moist, soil, what is the probability that:

(i) exactly 9 of them will germinate?

(ii) at least 2 of them will germinate?

Q.15 (4 points): A box contains 2 red, 4 white, and 6 green balls. Two balls are drawn out of the box without replacement. What is the probability that both balls are the same color?

Q.16 (3 points): What is the coefficient of x^5y^4 in the expansion of $(2x+y)^9$?

Q.17 (5 points): Use any appropriate method to solve the following system of linear equations:

$$2x+3y=-2$$
$$x+2y+3z=0$$
$$-y-5z=1$$

Q.18 (6 points): **Use the simplex method** to solve the linear programming problem

maximize $P = 2x_1 + 3x_2$ subject to the constraints:

$$x_1 + x_2 \leq 8$$

$$2x_1 + x_2 \geq 10$$

$$x_1 \geq 0 \text{ , } x_2 \geq 0$$

Q.19 (12 points):

(i) **Use Geometric Approach** (Graphing) to solve the linear programming problem.

minimize $C = 4x + 7y$ subject to the constraints:

$$x - y \geq 1$$

$$3x + 2y \geq 18$$

$$x \geq 0 \, , y \geq 0$$

(ii) **Use the simplex method** to solve the linear programming problem in part (i)