Prince Sultan University

Department of Mathematical Sciences

Final Exam

Semester I, 2008 FALL (081)
4th February, 2009
A

MATH 101 – Finite Mathematics

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

Maximum Points: 100 points

Name of the student :

ID number :

Section :

Instructor :

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 20 problems, some with several parts and a total of 7 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 & Q.6	21	
Q.7 & Q.8	12	
Q.9, Q.10, Q.11 & Q.12	18	
Q.13, Q.14 & Q15	18	
Q.16, Q.17, Q18, Q.19 & Q.20	21	
Total	**100**	

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

1) The lines $2x+3y=-5$ and $4x+6y=-10$ are:

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

2) Find the market price for the supply and demand equations: $\begin{cases} S=32p+700 \\ D=1,720-36p \end{cases}$

Where p is the price per unit in dollars.

(a) $p=\$17$ (b) $p=\$35$ (c) $p=\$21$ (d) $p=\$15$

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

$C=29x+615$; $R=34x$

(a) 4,182 units (b) 123 units (c) 128 units (d) 2,510 units

4) List the corner points for the collection of constraints of the linear programming problem.

$$\begin{cases} x \le 9 \\ 8x+4y \ge 32 \\ x \ge 0 \\ y \ge 0 \end{cases}$$

(a) $(0,0)$, $(0,8)$, $(4,0)$ (b) $(0,8)$, $(4,0)$, $(9,0)$ (c) $(9,0)$ (d) $(0,0)$, $(0,8)$, $(9,0)$

5) Write the equation of the line with slope undefined, containing the point $(-7,-4)$

(a) $x=-4$ (b) $x=-7$ (c) $y=-7$ (d) $y=-4$

6) If $\$20,000$ is borrowed for 6 months and $\$600$ is paid, what is the simple interest rate?

(a) 0.6% (b) 1.2% (c) 6% (d) 7.8%

7) If $A=\begin{bmatrix}1 & 2\end{bmatrix}$ and $B=\begin{bmatrix}3\\4\end{bmatrix}$ then,

(a) $A.B=[11]$ and $B.A$ is undefined (b) Neither $A.B$ nor $B.A$ is defined

(c) $A.B=B.A=[11]$ (d) $A.B=[11]$ and $B.A=\begin{bmatrix}3 & 6\\4 & 8\end{bmatrix}$

8) There are 6 people up for 4 different awards. In how many ways can the awards be given if a person cannot receive more than one award?

(a) $C(6,4)$ (b) $6!4!$ (c) $P(6,4)$ (d) 24

9) If E and F are mutually exclusive events, then $P(E|F)=$

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

10) When two fair dice are thrown, what is the probability that the sum of the two numbers that turn up is less than 11?

(a) $\frac{11}{12}$ (b) $\frac{1}{6}$ (c) $\frac{11}{12}$ (d) $\frac{5}{6}$

Q.2 (4 points): A student purchases a cellular telephone plan in which he is billed a fee of $\$5.15$ per month plus $\$0.08$ per minute for each call. Assuming the relationship is linear, What is the monthly charge for using 180 minutes of calls?

Q.3 (5 points): For a certain commodity, the demand equation is given by $D = -5p + 50$. At a price of $\$1$, twelve units of the commodity are supplied. If the supply equation is linear, and the market price is $\$4$, find the supply equation.

Q.4 (4 points): John decides to put aside $\$300$ every month in an insurance fund that pays 5.2% compounded monthly. After making 15 deposits, how much money does John have?

Q.5 (4 points): Find the amount in account if $\$675.20$ is invested at 10% compounded semiannually for 5 years.

Q.6 (4 points): Let $A = \begin{bmatrix} 2 & -3 \\ 1 & 5 \end{bmatrix}$, find the matrix X that satisfies $AX = B$, where $B = \begin{bmatrix} 4 \\ 2 \end{bmatrix}$

Q.7 (6 points): A survey of students at a certain university showed the following cars use:

13 use Toyota and Mazda	21 use Toyota
14 use Honda and Toyota	45 use Mazda
15 use Mazda and Honda	24 use Honda
8 use all three of the above	1 uses none of the above cars

(i) How many students were surveyed?

(ii) How many students use Honda but NOT Toyota?

(iii) How many students use at least one car besides Mazda?

Q.8 (6 points): Use the ***simplex method*** to solve the following linear programming problem:

Maximize $P = 12x_1 + 10x_2$ subject to the constraints:

$$x_1 + 2x_2 \geq 24$$
$$x_1 + x_2 \leq 40$$
$$x_1 \geq 0, x_2 \geq 0$$

Q.9 (6 points): Solve the following linear programming problem.

Minimize $C = 5x_1 + 10x_2$ subject to the constraints:

$$x_1 - x_2 \geq 1$$
$$-x_1 + x_2 \geq 2$$
$$x_1 \geq 0, x_2 \geq 0$$

Q.10 (4 points): If a class consists of 10 girls and 5 boys, how many different groups of 5 are made up of 3 boys and 2 girls?

Q.11 (4 points): How many different 6-letter words can be formed from the letters in the word FINITE?

Q.12 (4 points): Use Binomial Theorem to expand the expression $(2x^2 + 1)^5$.

Q.13 (6 points): A box contains 15 black balls, 20 White balls and 5 green balls.
Three balls are selected one at a time without replacing.

(ii) Find the probability that all three balls selected are black.

(ii) Find the probability that two white balls and one green ball are selected.

Q.14 (5 points): Let E and F be events with $P(E) = 0.5$, $P(F) = 0.4$ and $P(E \cup F) = 0.7$.

(i) Sketch the Venn diagram.

(ii) Find the following probabilities

a) $P(E \mid F) =$

b) $P(\overline{E} \cap \overline{F}) =$

Q.15 (7 points): The following table shows the results of a survey constructed by a perfume producer

	Like Perfume (L)	Did not like Perfume (D)	No opinion (N)
Male (M)	123	78	56
Female (F)	234	24	15

Find the following:

(i) how many are male and like Perfume.

(ii) how many are female or did not like Perfume.

(iii) the probability a person picked at random is male.

(iv) the probability a person picked at random is a male and did not like Perfume.

(v) the probability a person picked at random likes Perfume given that it is a female

Q.16 (5 points): A pair of dice is thrown. If it is known that one die shows a 4, what is the probability that the other die shows a 5?

Q.17 (4 points): In a 10-question true-false exam, the student gets A grade if he answered at least 8 questions correctly. In how many ways can a student get A grade?

Q.18 (4 points): In how many ways can 8 persons be distributed to three rooms in a hotel where two rooms are with 3 beds each, and the third room is with 2 beds?

Q.19 (4 points): A fair coin is tossed 7 times. Find the probability it comes up tails at least 2 times.

Q.20 (4 points): I took my **three** children shopping with me. I allow them to each choose a piece of candy from among 35 different kinds available.
What is the probability that they all choose different kinds of candy?
(Give your answer in percentage rounded to a whole number)