Prince Sultan University
Department of Mathematical Sciences

Final Exam

Semester II, 2008   SPRING (072)
10th June, 2008
A

MATH 101 – Finite Mathematics

Section

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

Maximum Points: 100 points

Name of the student:

ID number   :

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 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	18	
Q.10, Q.11, Q12 & Q.13	19	
Q.14, Q.15 & Q16	16	
Q.17 & Q18	13	
Q.19	8	
Total	**100**	

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

1) How many ways can a $3-$ person subcommittee be selected from a committee of 6 people?

   (a) 60 (b) 120 (c) 18 (d) 20

2) Suppose that $P(A) = 0.75$, $P(B) = 0.4$, and $P(A \cap B) = 0.3$, then $P(B/A) =$

   (a) $\dfrac{3}{4}$ (b) $\dfrac{2}{5}$ (c) $\dfrac{1}{15}$ (d) $\dfrac{7}{75}$

3) If the events A and B are independent and if $P(A/B) = 0.1$ and $P(B) = 0.3$, then $P(A)$ is:

   (a) 0.1 (b) 0.03 (c) 0.3 (d) 0.4

4) A college offers 2 courses in history, 4 in science, 1 in Math, 2 in philosophy, and 2 in English. If a student takes one course in each area, how many course selections are possible?

   (a) 13 (b) 192 (c) 16 (d) 32

5) The lines $x - 2y = 7$ and $2x + y = 4$ intersect.
   (a) $(1,-3)$ (b) $(3,2)$ (c) $(4,0)$ (d) $(3,-2)$

6) Suppose that $P(A) = 0.4$, $P(B) = 0.3$, and $P(A \cap B) = 0.1$. Then $P(A \cup B)) =$

   (a) 0.6 (b) 0.7 (c) 0.4 (d) 0.8

7) What is the total number of outcomes of the sample space of tossing 2 dice and a coin?

   (a) 14 (b) 72 (c) 128 (d) 24

8) If E and F are mutually exclusive events, then $P(E/F) =$

   (a) $P(E)$ (b) $P(F)$ (c) $P(E) \cdot P(F)$ (d) 0

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

   where p is the price per unit in dollars.

   (a) $p = \$3$ (b) $p = \$1$ (c) $p = \$9$ (d) $p = \$2$

10) A manufacturer sells his product at $\$23$ per unit. His fixed cost is $\$18,000$ and the cost per unit is $\$18.5$ The level of production at which the manufacturer breaks even is

   (a) $3,000$ units   (b) $3,500$ units   (c) $4,000$ units   (d) $5,000$ units

Q.2(4 points): In year 2000, a car dealer sold 54 thousand cars, and in 2005 the sales were 66 thousand.
Assume that the trend is linear.

   a) Find an equation of a line that will estimate the number of cars sold (in thousands) at any given year.

   b) Use the equation to predict the number of cars (in thousands) to be sold in 2012.

Q.3(4 points): Write an equation of the line passing through $(-3, 5)$ and parallel to the line passing
through $(6, 2)$ and $(1, -3)$.

Q.4(4 points): Let $A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 4 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 1 \\ 4 & -1 \\ 0 & 2 \end{bmatrix}$

Find $3AB$

Q.5(4 points): How much should you invest now at 10% to have $120,000\ SR$ toward the purchase of a car
in 5 years if the interest is compounded quarterly?

3

Q.6(4 points): Dan borrows $7,000 at 9% per annum simple interest for 30 months.
Determine the interest due on the loan.

Q.7(4 points): A typical pack-a-day smoker spends about $180\ SR$ per month on cigarettes. Suppose the smoker spends that amount each month in a savings account at 5% interest compounded monthly. What would the account be worth after 40 years?

Q.8(4 points): Consider the universal set $U = \{5,6,7,8,9,10,11\}$, $D = \{6,9,11\}$, $E = \{6,8,9,10\}$, and $F = \{5,7,8,9,11\}$

Find:

a) $(D \cup E) \cap F$

b) $\overline{D \cup E}$

Q.9(6 points): Given that A and B are subsets of U with $n(U) = 100$, $n(A) = 35$, $n(B) = 70$ and $n(A \cup B) = 85$.

a) Find $n(A \cap B)$

b) Find $n(A \cap \overline{B})$

c) Find $n(\overline{A} \cap \overline{B})$

Q.10(4 points): Given that $P(E) = 0.4$, $P(F) = 0.5$ and $P(E \cup F) = 0.7$. Find $P(E/F)$

Q.11(5 points): If A and B are events such that $P(A) = 0.5$ and $P(A \cup B) = 0.7$. **Find** $P(B)$ if:
a) A and B are mutually exclusive events.

b) A and B are independent events.

Q.12(4 points): A company wants to have a $5-$digit phone extensions with the first digit not being zero. How many different extensions are possible?

Q.13(6 points): Out of 250 students, 110 played basketball, 130 played football, and 40 played both. Find the number of students who

a) did not play either sport.

b) played exactly one sport.

c) played football, but not basketball.

Q.14(6 points): In a study to determine the *IQ* ranges of males and females, $1,000$ people were chosen and the following results were recorded:

a) What is the probability of a person having an *IQ* Below 90, given that the person is a female?

	IQ			
	Below 90 A	90 - 120 B	Above 120 C	Total
Female, F	130	286	104	520
Male, M	120	264	96	480
Total	250	550	200	1,000

b) What is the probability of a person being male, given that he scored above 120 in the *IQ*?

c) What is the probability of a person being a female and having an *IQ* between 90 – 120?

Q.15(6 points): A car repair shop has found that the probability that a car will require a tune-up(T) is 0.6, the probability the car requires a brake job(B) is 0.2, and the probability it requires both is 0.12

a) Find the probability that a car requires either a tune-up or a brake job.

b) Find the probability that a car requires tune-up, but not brake job.

c) Find the probability that a car requires neither tune-up nor brake job.

d) What are the odds for the event T?

Q.16(4 points): A marksman hits a target with probability $\dfrac{4}{5}$. Assuming independence for successive firings. Find the probability of getting

a) 1 miss followed by 2 hits.

b) 3 hits and 1 miss(in any order)

Q.17(6 points): Two fair dice are rolled. Let $E = \{$the first die shows a "3"$\}$

and let $F = \{$the sum on the two faces is $8\}$

    a) Find $P(E/F)$

    b) Are the events E and F independent? Why or why not?

    c) Are the events E and F mutually exclusive? Why or why not?

Q.18(7 points): Use *any appropriate method* to solve the following linear programming problem:

    Maximize $\quad P = 3x_1 + 7x_2 \quad$ subject to the constraints:

$$2x_1 + x_2 \leq 16$$
$$x_1 + x_2 \geq 6$$
$$x_1 \geq 0, x_2 \geq 0$$

Q.19(8 points): Use the ***simplex method*** to minimize $C = 8x_1 + 16x_2$ subject to the constraints:

(Use any appropriate method)

$$x_1 + 5x_2 \geq 9$$
$$2x_1 + 2x_2 \geq 10$$
$$x_1 \geq 0, x_2 \geq 0$$