



Prince Sultan University
Department of Mathematical Sciences

Final Exam

Semester II, 2010 SPRING (102)
5th June , 2011

MATH 101A – 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 18 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	18	
Q.6, Q.7, Q.8, Q.9, Q.10	22	
Q.11, Q.12, Q.13	13	
Q.14, Q.15	13	
Q.16, Q.17	16	
Q.18	8	
Total	100	

40

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

- 1) If the odds for rain today are 1 to 3, what is the probability of rain today?
(a) 0.25 (b) 0.33 (c) 0.5 (d) 0.75
- 2) Determine the total number of subsets of the following set: $\{h, i, j, k, l, m, n\}$
(a) 128 (b) 14 (c) 64 (d) 32
- 3) If E and F are mutually exclusive events, find $P(E/F)$
(a) $P(F)$ (b) $P(E) \cdot P(F)$ (c) 0 (d) $P(E)$
- 4) Find the point of intersection of the lines $x - 2y = 7$ and $2x + y = 4$
(a) (4, 0) (b) (1, -3) (c) (3, -2) (d) (3, 2)
- 5) Two events A and B are independent. If $P(A/B) = 0.1$ and $P(B) = 0.3$, find $P(A)$.
(a) 0.4 (b) 0.1 (c) 0.3 (d) 0.03
- 6) Determine whether the given pair of lines are parallel, coincident, or intersecting.
 $L: x + 2y = -12$
 $M: -4x - 8y = 48$
(a) intersecting (b) parallel (c) coincident (d) can't be determined
- 7) Suppose that $P(A) = 0.5$, $P(B) = 0.4$, and $P(A \cap B) = 0.2$. Then $P(\overline{A \cup B}) =$
(a) 0.7 (b) 0.4 (c) 0.8 (d) 0.3
- 8) There are 8 students on the swimming team and 12 students on the badminton team. What is the total number of students on the two teams if three students are on both teams:
(a) 17 (b) 15 (c) 23 (d) 20
- 9) Suppose E and F are mutually exclusive events with $P(E) = 0.2$ and $P(F) = 0.5$
Find $P(E \cup F)$
(a) 0.7 (b) 0.6 (c) 0.1 (d) 0
- 10) If \$18,000 is borrowed for 4 months and \$360 of simple interest is paid, what is the interest rate?
(a) 7.80% (b) 6.0% (c) 0.60% (d) 1.20%

Q.2 (4 points): Find the equation of the line containing the point $(2, -5)$ and parallel to the line containing the points $(-1, -3)$ and $(-9, -8)$.

Q.3 (4 points): A bank pays interest of 7.5% compounded quarterly. If \$236,000 is placed in a savings account, how much money is in the account after 10 years?

Q.4 (6 points): You run a food stand and have decided to sell buffalo wings, but are unsure of the price you should set for the spicy treat. You know the following information.

- If you sell wings for \$0.5 each, customers will demand 400 and you will supply 300 wings.
 - If you sell a wing for \$0.75, customers will buy 350 wings and you will be willing to supply 500 wings
- What is the market price for each wing?

Q.5 (4 points): Find the monthly payment that should be made to accumulate an amount of \$55,000 after 8 years if the interest is 4% compounded monthly.

Q.6 (4 points): Suppose you rent a car for one day at the rate of \$25 per day plus 20 cents per mile. How many miles could you drive for a rental charge of \$90?

Q.7 (4 points): In how many ways can 15 people sit around two round tables with seating capacities of 7 and 8 people?

Q.8 (4 points): The probability that a fisherman will catch a fish on a given day is 0.7 and is independent of his chances on any other day. If he fishes for 5 days,
(a) what is the probability that he catches a fish in 2 days?

(b) what is the probability that he catches a fish in the last 2 days?

Q.9 (4 points): Suppose $P(E) = 0.8$, $P(F) = 0.24$, $P(E \cap F) = 0.18$, what is $P(\bar{E} | \bar{F})$?

Q.10 (6 points) There are 7 rotten (bad) apples in a box of 26 apples. 3 apples are selected at random.
(a) How many samples of 3 apples can be drawn from the box?

(b) What is the probability that 2 good apples and 1 rotten apple are drawn?

(c) What is the probability that all 3 apples are rotten?

Q.11 (3 points): How many integers, greater than 999 but less than 4000, can be formed with the digits 0, 1, 2, 3, and 4, if repetition of digits is allowed?

Q.12 (6 points): The following table represents the numbers, in thousands, of people with and without health insurance coverage by age in last year in a certain city.

	Age		
	<18	18 - 59	> 60
Health Insurance	146	167	10
No Health Insurance	18	44	78

(a) find the probability that a person is between 18 and 59 years old,

(b) find the probability that a person is older than 60 years old given that he has health insurance

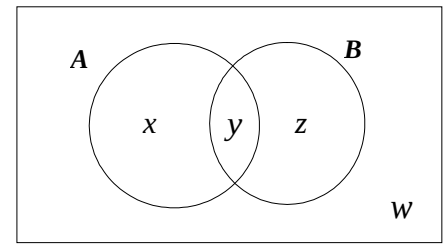
(c) are the events "<18 years old", and "Health insurance" independent events? Explain

Q.13 (4 points): A fair coin is tossed 6 times.

a) In how many ways can exactly 2 heads appear?

b) Find the probability that not less than 2 tails appear.

Q.14 (5 points) Given $n(\bar{A}) = 65$, $n(\bar{B}) = 40$, $n(\bar{A} \cap \bar{B}) = 25$, and $n(U) = 150$. Find x , y , z , and w



Q.15 (8 points): A survey of a group of criminals shows that 65% came from low-income families, 40% from broken homes, and 30% came from low-income and broken home.

Define: L : Criminal came from low-income family

B : Criminal came from broken home

A criminal is selected at random.

(a) Find the probability that the criminal is not from a low-income family.

(b) Find the probability that the criminal comes from a broken home or a low-income family.

(c) Find the probability that the criminal comes from a broken home knowing that he is from a low-income family.

(d) Are L and B independent events? Show your work.

Q.16 (8 points): Use matrices to solve the system:

$$x + 2y = 4$$

$$y + 2z = -1$$

$$3x + z = 5$$

Q.17 (8 points) Use the simplex method to maximize $P = 2x_1 + 3x_2$ subject to the constraints:

$$x_1 + x_2 \leq 8$$

$$2x_1 + x_2 \geq 10$$

$$x_1 \geq 0, x_2 \geq 0$$

Q.18 (8 points) Use any appropriate method to solve the following linear programming problem

Minimize $C = 5x + 4y$ subject to the constraints:

$$x + y \geq 2$$

$$x + 3y \leq 12$$

$$3x + y \leq 12$$

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