Prince Sultan University

Department of Mathematical Sciences

Major III Exam A

Semester I, 2008 Fall (081)

20th January, 2009

MATH 101 – Finite Mathematics

Time Allowed : 90 minutes
Maximum Points: 100 points

Name of the student: _____

ID number : _____

Section : _____ **Instructor's Name:** _____

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 11 problems, some with several parts and a total of 6 pages. Make sure your paper has all these problems.

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

Q.1 (8 points) Write *True* or *False* for each of the following statements.

1) $P(8,3) = P(8,5)$ _____

2) The total possible outcomes of throwing 2 fair dice is 12. _____

3) If E and F are events,then sometimes $P(E \cup F) = P(E) + P(F)$ _____

4) $\{1,4\} \cup \{2,3\} \subset \{1,2,3,4\}$ _____

5) If E and F are mutually exclusive events, then $P(E \cap F) = 0$ _____

6) If $P(E) = 0.2$ and $P(F) = 0.4$, then $P(E \cup F)$ is always 0.6 _____

7) If E is an event, then $P(E) = 1 + P(\overline{E})$ _____

8) $\overline{(A \cup B)}$ = $\overline{A} \cap \overline{B}$, for any sets A and B _____

Q.2* (12 points) Circle *the correct answer.

1) In how many possible ways can 10 True- False questions be answered?
(a) 20 (b) $1,024$ (c) 45 (d) 90

2) If $n(A) = 20$, $n(B) = 20$, $n(A \cap B) = 9$, then $n(A \cup B) = ?$

(a) 40 (b) 39 (c) 31 (d) 28

3) A television network has 5 hour time slots to fill. If there are 10 shows to choose from, how many different lineups are possible?

(a) 252 (b) $30,240$ (c) 120 (d) 50

4) How many license plates consisting of two letters followed by four digits are possible?
(use the English alphabet with repetition of letters allowed)

(a) $\frac{26^2 10^4}{2!4!}$ (b) $26^2 10^4$ (c) $C(26,2) \cdot C(10,4)$ (d) $P(26,2) \cdot P(10,4)$

5) If the probability of an event is $\frac{2}{7}$, what are the odds for the event taking place?

(a) 2 to 7 (b) 2 to 5 (c) 7 to 2 (d) 5 to 2

6) A classroom has 20 chairs and 12 students. If the student chooses to sit wherever he wants. In how many ways can this be done?

(a) $C(20,12)$ (b) $P(20,12)$ (c) $\frac{20!}{12!}$ (d) 240

7) How many nine-letter words (real or imaginary) can be formed from the letters of the word "**Chemistry**"?

(a) $3,124,550$ (b) $40,320$ (c) $387,420,489$ (d) $362,880$

8) Suppose you toss a coin. The coin is weighted so that head $\{H\}$ is 6 times more likely to occur than tail $\{T\}$. Which assigned probabilities are true?

(a) $P(H)=\frac{1}{7}$, $P(T)=\frac{6}{7}$ (b) $P(H)=\frac{4}{7}$, $P(T)=\frac{1}{4}$

(c) $P(H)=\frac{6}{7}$, $P(T)=\frac{1}{7}$ (d) $P(H)=\frac{7}{6}$, $P(T)=\frac{1}{6}$

9) Find the number of outcomes of the sample space associated with the experiment of tossing 2 dice and 4 coins.

(a) 52 (b) 576 (c) 80 (d) 20

10) Suppose *E* and *F* are mutually exclusive events and $P(E)=0.29$ and $P(F)=0.14$, then what is $P(\overline{E\cup F})$?

(a) 0.39 (b) 0.14 (c) 0.57 (d) 0.43

11) Suppose $P(E)=0.36$, $P(E\cup F)=0.37$, and $P(E\cap F)=0.21$ then what is $P(F)$?

(a) 0.22 (b) 0.37 (c) 0.78 (d) 0.21

12) Waleed has 6 shirts and 4 pairs of pants. How many different outfits can he wear?

(a) 10 (b) 24 (c) 40 (d) 15

Q.3 Consider the universal set *U*, and the sets *A*, *B*, and C given by $U=\{1,3,4,5,10,11,13\}$,

$A=\{1,10,11\}$, $B=\{3,4,10\}$, and $C=\{3,11\}$

Find a) $(A\cup B)\cap C$

b) $\overline{B}\cap A$

c) $\overline{A}\cup\overline{B}$

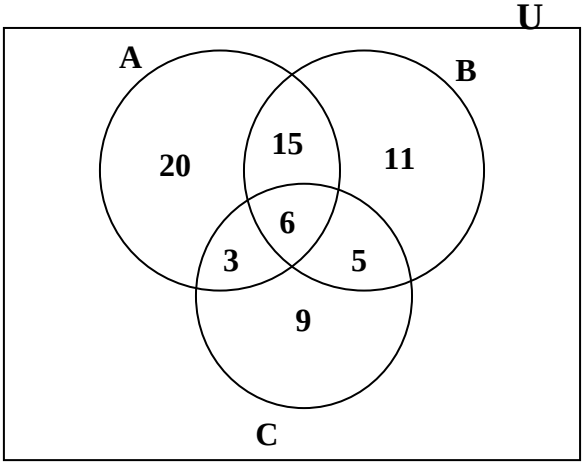
Q.4 Use the data in the figure to answer the following questions:

a) How many elements are in set A ?

b) How many elements are in B or C ?

c) How many elements are in A but not in C ?

d) How many elements are in A and B ?



Q.5 A survey of 150 graduates revealed that 70 took Arabic, 80 took English, 50 took French. 33 took Arabic and English, 24 took Arabic and French, 18 took French and English and 3 took all three Languages.

a) Show the data above on the Venn diagram.

b) How many of the graduates took Arabic and English but not French?

c) How many of the graduates took none of the three subjects?

Q.6 Suppose you are forming a password consisting of 4 characters.
For each character you could use the 7 digits(0 through 6), and the 5 letters ($A, B, C, D,$ and E).
How many different passwords can you form if you are **not allowed** to repeat characters?

Q.7 You and a friend are going out to eat. The restaurant has 9 different appetizers, 3 different soups, 5 different dishes, and 6 different desserts. How many different types of meals can you form if you order one each of an appetizer, soup, dish, and dessert?

Q.8 The table below shows a survey of a certain group of children and adults as to their favorite pastimes.

	Children	Adults
Enjoyed movies	114	161
Enjoyed reading	101	109
Enjoyed sports	158	135

Find

a) The number of people whose favorite pastime was going to the movies

b) The number of people whose favorite pastime was either going to the movies or reading

c) The number of people who were either children or whose favorite pastime was sports.

Q.9 After a survey of the number of cell phones a household own, the following probability table was constructed.

Number of Cell Phones	Probability
0	0.24
1	0.22
2	0.09
3	0.41
4 or more	0.04

Find the probability that

a) A household owns 1 or 2 cell phones

b) A household owns at least 3 cell phones

Q.10 A class consists of 15 students. The instructor wants to pick a group of 4 to work on a special project.

a) How many different groups of 4 can he choose?

b) If the class consists of 10 girls and 5 boys, how many different groups of 4 are made up of 2 boys and 2 girls?

Q.11 On a shelf we are to arrange 4 different computer books and 5 different math books. In how many ways can this be done if the computer books are to be grouped together on the left and the math books are to be grouped together on the right?

Q.12 The digits ($1, 2, 3, 4, 5, 6,$ and 7) are written on seven cards. Three cards are drawn, and a $3-$ digit number is formed. How many three-digit numbers can be formed this way?

Q.13 20 people ran a marathon. The first 3 people to finish will receive an award for their finish position starting with first place. How many ways can the awards be given?

Q.14 You are lining up books by color. There are 16 books of which 4 are brown, 6 are black, and 6 are red. How many different ways are there to line these books up?

Q.15 A box contains 10 red marbles, 7 green marbles, and 3 blue marbles. One marble is picked from the box. Find the probability of each event.

a) Red marble is picked.

b) Red or green marble is picked.

c) Neither red nor green is picked.

Q.16 If $P(A) = 0.25$, $P(B) = 0.50$, $P(A \cap B) = 0.20$, find each of the following probabilities:

a) $P(A$ or $B)$

b) $P(B$ but not $A)$

c) $P($ neither A nor $B)$

Q.17 Use the binomial theorem to

a) determine the last three terms in the expansion: $(x + y)^{12}$

b) find the coefficient of x^7 in the expansion: $(x - 2)^{10}$

Q.18 Suppose the odds for the Brazilian team winning the World Cup are 7 to 4, what is the probability of the Brazil winning the World Cup? (Round your answer to two decimal places.)