Prince Sultan University

Department of Mathematical Sciences

Major III Exam A

Semester I, 2010 Fall (101)

January 8, 2011

MATH 101 – Finite Mathematics

Time Allowed : 100 minutes

Maximum Points: 100 points

Name of the student:_____

ID number :_____

Section : _____

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 17 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 , Q.2	21	
Q.3 , Q.4	12	
Q.5 , Q.6 , Q.7 , Q.8	20	
Q.9 , Q.10 , Q.11 , Q.12 , Q.13	23	
Q.14 , Q.15 , Q.16 , Q.17	24	
Total	**100**	

Q.1 (6 points) **Write *True* or *False* for each of the following statements.**

1) $P(7,3) = P(7,4)$ _____

2) $\overline{A} \cup \overline{B} = \overline{A \cup B}$ _____

3) If $A \cup B = A$, then $A \cap B = B$ _____

4) $\{3,7\} \subset \{0,3,7,9\}$ _____

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

6) If $P(E) = 0.3$ and $P(F) = 0.5$, then $P(E \cup F)$ is sometimes = 0.8 _____

Q*.2 (15 points)** **Circle *the correct answer.

1) How many license plates consisting of two letters followed by four digits are possible? (Use the English alphabet with repetition of letters and numbers allowed)

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

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

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

3) 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

4) How many nine-letter words can be formed from the letters of the word "**Classroom**"?

(a) $90,720$ (b) $3,024$ (c) $387,420,489$ (d) $362,880$

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

(a) 10 (b) 24 (c) 40 (d) 12

6) 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

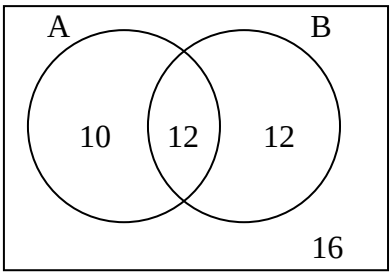
7) The odds for an event E is $3:8$. Find the probability that the event E will happen.

(a) $P(E)=\frac{3}{8}$ (b) $P(E)=\frac{3}{5}$ (c) $P(E)=\frac{3}{11}$ (d) $P(E)=\frac{8}{11}$

8) Find the number of outcomes of the sample space associated with the experiment of tossing 3 dice and 3 coins.

(a) 26 (b) 51840 (c) $1,728$ (d) 432

9) Use the Venn Diagram to find how many elements are in the set $\overline{A}$.



(a) 28 (b) 24

(c) 40 (d) 12

10) If $n(A)=20$, $n(B)=30$, $n(A\cup B)=45$, and $n(\overline{A}\cap\overline{B})=10$, then $n(U)=$

(a) 95 (b) 50 (c) 55 (d) 60

Q.3 (6 points) Consider the universal set *U*, and the sets *A*, *B*, and C given by $U=\{1,2,3,5,8,9,10\}$ $A=\{1,8,9\}$ $B=\{2,3,8\}$, and $C=\{2,9\}$

Find a) $\overline{A}\cap\overline{B}$

b) $(A\cup B)\cap C$

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

Q.4 (6 points) Given that $n(A)=30$, $n(B)=50$, $n(A\cup B)=70$, and $n(U)=100$ determine the number of elements in each of the following:

a) $n(A\cap\overline{B})=$

b) $n(A\cap B)=$

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

Q.5 (6 points) A survey of 1100 in a certain city indicates that 830 own microwave ovens, 730 own DVD players, and 570 own microwave ovens and DVD players.

a) How many people in the survey own either a microwave oven or a DVD player?

b) How many own neither a microwave oven nor a DVD player?

c) How many own a microwave oven and do not own a DVD player?

Q.6 (4 points) The table below shows employment figures by gender for a certain city's civilians

	Male	Female
Employed	45734	54510
Unemployed	3526	1656
Not in Labor Force	19655	22395

Find

a) The number of this city's civilians who are unemployed or not in the labor force.

b) The number of this city's civilians who are male or unemployed.

Q.7 (6 points) An experiment consists of rolling two fair dice. Find the probability that

a) a sum less than 10 is rolled.

b) a sum less than 3 or greater than 10 is rolled.

Q.8 (4 points) How many **even five-digit** numbers can be formed from the digits 0 to 9 if repetition is allowed?

Q.9 (4 points) Suppose you are forming a password. The password will have 5 characters consisting of the 4 digits, 0 through 3, and the 5 letters A,B,C,D, and E.
How many different types of passwords can you form if you are not allowed to repeat characters?

Q.10 (6 points) A 4- person committee is to be selected out of two departments A and B with 19 and 26 people, respectively. In how many ways can the following committees be selected?

(i) 3 people from A and 1 from B

(ii) 4 people regardless of the department.

(iii) At least 3 from department B.

Q.11 (4 points) 20 people ran a marathon. The first 3 people to finish will receive an award for their finish position. How many ways can the awards be given?

Q.12 (5 points) You are lining up books by color. There are 17 books, of which 8 are brown, 4 are black, and 5 are red. How many different ways are there to line these books up?

Q.13 (4 points) What is $\binom{12}{0}+\binom{12}{1}+\binom{12}{2}+\cdots+\binom{12}{12}$?

Q.14 (6 points) A box contains 14 red marbles, 8 green marbles, and 4 blue marbles. Find:

a) the probability of a Green marble being picked.

b) the probability of Red or Blue marble being picked.

c) the probability of Neither red nor green is picked.

Q.15 (6 points) Use the binomial theorem to

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

b) give the 20^{th} term of in the expansion: $(x+2)^{30}$

Q.16 (6 points) A survey is taken as to a certain groups preference of entree. The results are shown in the table below.

Entree Type	Percentage
Beef	22%
Lamb	22%
Chicken	13%
Fish	40%
Vegetarian	?

Find the probability that

a) A person prefers Beef or Lamb

b) A person is a vegetarian.

c) A person does not prefer fish.

Q.17 (6 points) Consider the following set $A=\{a,b,c,d,e,f,g,h,i,j\}$

(i) How many different subsets does the set A have?

(ii) How many different subsets with at least 3 letters each does the set A have?