Prince Sultan University

Department of Mathematical Sciences

Major III Exam

Semester II, 2008 SPRING (072)

25th May, 2008

A

MATH 101 – Finite Mathematics

Time Allowed : 2 hours

Maximum Points: 100 points

Name of the student:

ID number: _____ Instructor's Name: _____

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. Provide an organized complete solution for each Question.
8. This examination has a total of 8 pages and 12 problems. Make sure your paper has all these problems.

Question	Your Score	Maximum score
Q.1 & Q.2		15
Q.3 & Q.4		8
Q.5, Q.6 & Q.7		18
Q.8, Q.9, Q.10, & Q.11		18
Q.12, Q.13, Q.14 & Q.15		18
Q.16, Q.17, Q.18, Q.19 & Q20		23
Total		**100**

Q.1(5 points): Write *True* or *False* for each of the following statements.

1) $\{5,6,9,12\} \subseteq \{5,6,7,8,9,10,11,12\}$ _____

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

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

4) $P(9,4) = P(9,5)$ _____

5) If $P(E) = 0.2$ and $P(F) = 0.4$, then $P(E \cup F)$ must be 0.6 _____

Q.2(10 points): Circle *the correct answer.*

1) A classroom has 20 chairs and 4 students. How many different ways are there for the students to sit in the chairs?

(a) $C(20,4)$ (b) $P(20,4)$ (c) $\frac{20!}{4!}$ (d) 80

2) A package contains 100 fuses, of which 10 are defective. A sample of 5 fuses is selected at random. How many samples contain exactly 2 defective fuses?

(a) $C(100,3) \cdot C(10,2)$ (b) $C(5,2) \cdot 100^2$ (c) $\frac{P(100,5)}{2!3!}$ (d) $C(90,3) \cdot C(10,2)$

3) Calculate $\binom{n}{n-1}$

(a) $n(n-1)$ (b) $n!$ (c) n (d) $n-1$

4) In how many ways can the letters of the word " CREAM " be arranged?

(a) 30 (b) 120 (c) $3{,}125$ (d) 60

5) The set $\{2,4,6,8,10,12\}$ has how many different subsets?

(a) 42 (b) 32 (c) 64 (d) 12

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

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

7) A large basket of fruit contains 3 oranges, 2 apples and 5 bananas. If a piece of fruit is chosen at random, What is the probability of getting an orange or a banana?

(a) $\frac{7}{10}$ (b) $\frac{4}{5}$ (c) $\frac{1}{2}$ (d) $\frac{15}{100}$

8) An exam contains 6 "true or false" questions. What is the probability that a student guessing the answers will get 4 answers correct?

(a) $\frac{4}{64}$ (b) $\frac{15}{64}$ (c) $\frac{1}{3}$ (d) $\frac{2}{3}$

9) A jar contains 7 red balls, 2 green balls, 5 white balls and 8 yellow balls. Two balls are chosen from the jar one after the other ***with replacement***. The probability of choosing one red and one yellow ball is:

(a) $\frac{28}{121}$ (b) $\frac{8}{33}$ (c) $\frac{14}{121}$ (d) $\frac{15}{22}$

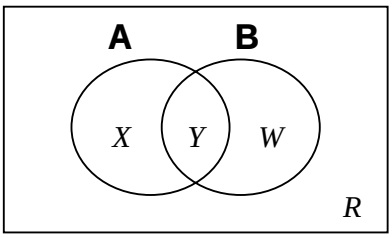
10) If the odds of a horse winning a particular race are 1 to 5, what is the probability that he will win?

(a) $\frac{5}{6}$ (b) $\frac{4}{5}$ (c) $\frac{1}{5}$ (d) $\frac{1}{6}$

Show Your Work

Q.3(4 points): Use the given information and the Venn diagram to answer the following questions.

$n(A)=18$, $n(B)=20$, $n(A\cap B)=14$, and $n(\overline{A})=40$



a) Find the number that should be in place of X.

b) Find the number that should be in place of Y.

c) Find the number that should be in place of W.

d) Find the number that should be in place of R.

Q.4(4 points): A person purchasing a new car has several options: 5 interior color choices, 7 exterior color choices, 3 choices of radios, and 4 choices of body styles. How many different cars are possible if one choice is made for each option?

Show Your Work

A

Q.5(6 points): 80 cities were surveyed to determine sports teams. 24 had baseball(B), 25 had football(F), and 20 had basketball(K). 10 had baseball and football, 12 had baseball and basketball, 11 had football and basketball. 5 had all three sports.

a) Place the numbers in a Venn diagram showing the given information.

b) How many had baseball and football, but not basketball?

c) How many had baseball or football?

d) How many had exactly two teams?

Q.6(6 points): For the universal set $U = \{1,2,3,4,5,6,7,8,9\}$ and given that $X = \{2,4,6,8\}$, $Y = \{2,3,4,5,6\}$, and $Z = \{1,2,3,8,9\}$. Find:

a) $X \cap (Y \cup Z)$

b) $\overline{Y} \cap Z$

c) $\overline{X} \cap \overline{Y}$

Q.7(6 points):

A company has 8 senior and 5 junior officers. A committee is to be formed. In how many ways can a $4-$officer committee be formed so that it is composed of

a) Any 4 officers?

b) 3 senior officers and 1 junior officer?

c) At least 3 junior officers?

Show Your Work

A

Q.8(4 points): A combination lock on a suitcase has 4 wheels, each labeled with digits 1 to 8. How many 4-digit combination lock codes are possible if no digit can be repeated?

Q.9(5 points): A jar contains 4 white marbles, 3 yellow marbles, 5 red marbles, and 3 blue marbles. Two marbles are picked at random without replacement.

a) What is the probability that both marbles are blue?

b) What is the probability that 1 marble is red and 1 marble is white?

Q.10(4 points): In a horse race, how many different finishes among the first 3 places are possible if 10 horses are running?

Q.11(5 points): A college survey was taken to determine where students study. Of 125 students surveyed, 68 studied in the cafeteria, 62 studied in the student lounge, 22 studied in both the Cafeteria and the student lounge.

a) Draw a Venn diagram showing the data.

b) How many students study only in the cafeteria?

c) If a student is selected at random, what is the probability that he studies neither in the cafeteria nor in the student lounge?

Show Your Work

A

Q.12(5 points): Two fair dice are rolled.

a) List the outcomes of the event E :the two faces show same numbers.

b) What is the probability that the sum of the faces is greater than 8?

Q.13(5 points): In a shipment of 40 televisions, 6 are defective. If a person buys 5 televisions from that shipment, what is the probability that 4 of them are defective?

Q.14(4 points): a) Find the ***odds for*** an event E if the probability for E is $\frac{3}{11}$.

b) Find the ***odds against*** obtaining a number less than 3 in a single roll of a die.

Q.15(4 points): A person has 3 history books, 5 English books, and 7 Mathematics books. How many ways can the books be arranged on a shelf if books on the same subject must be together?

Show Your Work

A

Q.16(5 points): A fair coin is tossed 7 times.

a) Find the probability that exactly 3 heads appear.

b) Find the probability that at least 2 tails appear.

Q.17(6 points): Use the Binomial Theorem to:

a) Find the coefficient of x^7 in the expression $(x-3)^{10}$

b) Find the last three terms of the expansion of $(x+y)^{13}$

Q.18(4 points): How many subsets of 5 letters each can be formed from the set $\{a,b,c,d,e,f,g\}$?

Q.19(4 points): How many $8-$letter words(real or imaginary) can be formed from the word" INFINITY".

Q.20(4 points): Suppose that 7 females and 5 males have applied for 3 positions in a company. If the 3 positions have been filled at random from the 12 applicants, what is the probability of selecting 2 females and 1 male?