



Prince Sultan University
Department of Mathematical Sciences

Major III Exam
Semester I, 2007 Fall (071)
9th January, 2008

A

MATH 101 – Finite Mathematics

Time Allowed : 90 minutes

Maximum Points: 100 points

Name of the student:

ID number :

Section :

Instructor : Mr. Khaled Naseralla

Question	Your Score	Maximum score
Q.1 & Q.2		13
Q.3, Q.4, Q.5, Q.6 & Q.7		24
Q.8, Q.9, Q.10, Q.11 & Q.12		22
Q.13, Q.14, Q.15, Q.16 & Q.17		25
Q.18, Q.19 & Q.20		16
Total		100

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

- 1) If $(A \cup B) = A$, then $(A \cap B) = B$. _____
- 2) $\overline{(A \cup B)} = \bar{A} \cup \bar{B}$, for any sets A and B _____
- 3) $\bar{A}$ and A are disjoint sets. _____
- 4) The number of possible outcomes when five coins are tossed, and the list of heads and tails is noted, is 10. _____
- 5) The number of the different subsets that can be chosen from a set with 5 elements is 10 subsets. _____
- 6) There are 10 people whose names begin with "A" and 12 people whose names begin with "O." Thus there are a total of 120 people whose names begin either with "A" or "O." _____
- 7) If $P(E \cup F) = 0.7$, $P(E) = 0.4$, and $P(F) = 0.3$, then $P(E \cap F) = 0$ _____
- 8) If $P(E) = 0.3$ and $P(F) = 0.5$, then $P(E \cup F)$ must be 0.8 _____

Q.2(5 points): Circle the correct answer.

- 1) Out of a class of 200 students, 130 passed the first exam and 120 passed the second. If 90 students passed both exams, how many passed neither exam?
 (a) 120 (b) 130 (c) 140 (d) 40
- 2) Waleed has 6 shirts and 4 pairs of pants. How many different outfits can he wear?
 (a) 10 (b) 24 (c) 40 (d) 12
- 3) How many 4-letter words can be made using the first 7 letters of the alphabet? (Repeated letters are allowed)
 (a) 840 (b) 2401 (c) 16384 (d) 35
- 4) Simplify $\frac{(n-2)!}{(n-3)!}$
 (a) 0 (b) n (c) $n-2$ (d) $(n-2)!$
- 5) 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) $P(26,2) \cdot P(10,4)$

Show Your Work

Q.3(4 points): How many ways can a student select 4 different Grammar books and 3 different Reading books from a set of 8 Grammar and 6 Reading books?

Q.4(6 points):

A student sports survey of 100 students revealed that :	
48 <u>jogged</u>	17 <u>jogged</u> and <u>played basketball</u>
50 <u>played basketball</u>	15 <u>jogged</u> and <u>swam</u>
38 <u>swam</u>	18 <u>played basketball</u> and <u>swam</u>
2 practiced all three sports	

Use,

J: students who jogged

B: students who played basketball

S: students who swam

- Place the numbers in a Venn diagram interpreting the given information.
- How many students jogged but neither played basketball nor swam?
- How many students participated in exactly two of these sports?

Q.5(6 points): For the universal set $U = \{1, 2, 3, 4, 5, 6, 7\}$ and given that $A = \{1, 3, 5, 6\}$, $B = \{2, 3, 6, 7\}$, and $C = \{4, 6, 7\}$. Find:

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

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

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

Q.6(4 points): Given $c(A) = 14$, $c(A \cup B) = 28$, and $c(A \cap B) = 5$, find $c(B)$.

Q.7(4 points): 2 soups, 5 meat dishes, and 3 desserts are on the menu of a restaurant.
How many different meals are possible, each consisting of one soup, one meat dish, and one dessert?

Show Your Work

Q.8(5 points): If E and F represent mutually exclusive events, $P(E) = 0.30$ and $P(F) = 0.45$. Find each of the probabilities:

a) $P(\overline{E})$

b) $P(E \cap F)$

c) $P(E \cup F)$

d) $P(\overline{E \cap F})$

e) $P(\overline{E} \cap \overline{F})$

Q.9(4 points):

Saud makes two calls on his phone to Bader and Ali. The probability that Bader answers is 0.75 ; the probability that Ali answers is 0.63 ; the probability that both answer is 0.54 . Find the probability that Saud reaches **at least** one of these 2 guys.

Q.10(4 points): A test has 10- true-false questions.
How many ways are there to answer the questions on this test?

Q.11(5 points): A box containing 8 white balls and 7 blue balls. 4 balls are chosen at random.
a) In how many ways can exactly 3 of the 4 balls be blue?

b) In how many ways can at least 3 of the balls be white?

Q.12(4 points): A 10-member club must elect 4 officers: a president, vice-president, secretary, and treasurer. How many different election results are possible?

Show Your Work

Q.13(5 points): In a group of tourists, 20 tourists like to fly American Airlines, 30 tourists like to fly British Airways, and 6 tourists like to fly both.

- how many tourists like to fly only one of these airlines?
- how many tourists like to fly one or both of these airlines?

Q.14(4 points): How many three-digit numbers greater than 500 can be formed from the digits 2,3,4,5,6, and 7 if repetition is allowed?

Q.15(4 points): Five non-permanent seats in the UN Security Council are to be selected from among 10 countries. How many such sets of 5 nations are there?

Q.16(8 points): Use the binomial theorem to:

- a) determine the last three terms in the expansion: $(x + y)^{10}$
- b) find the coefficient of x^6 in the expansion: $(x - 3)^8$
- c) determine the 13^{th} term in the expansion of $(2x + y)^{18}$
- d) find the number of subsets of 4 – elements each that can be formed from a set of 10 elements.

Q.17(4 points): How many different 9-letter words can be formed from the word " UNUSUALLY" ?

Show Your Work

Q.18(6 points): Let A and B with $P(A) = 0.25$, $P(B) = 0.45$, and $P(A \cap B) = 0.25$, find the Probability that:

- a) A or B happens
- b) A doesn't happen
- c) neither A nor B happens

Q.19(4 points): In a survey of the number of TV sets in a house, the following probability table was constructed:

Number of TV sets	0	1	2	3	4 or more
Probability	0.06	0.25	0.35	0.22	0.12

Find the probability of a house having;

- a) 1 or 2 TV sets
- b) 3 or more TV sets
- c) Fewer than 2 TV sets
- d) 8 TV sets

Q.20(6 points): A pair of fair dice is tossed.

- a) What is the probability that the faces show the same number?
- b) What is the probability that the sum of the faces is more than 5?