PRINCE SULTAN UNIVERSITY

MATH 101 FINITE MATHS

FINAL EXAM 11TH JUNE 2005

Start : 8:00 am
End: 10:30 am

Name _____

I.D. _____

Section: Circle one (Dr. Aiman – 12) (Mr. Abid – 11)

١. Answer all questions.
٢. This exam consists of 7 pages, 13 questions
٣. You can use a calculator, NOT a mobile phone.
٤. No talking during the test.
٥. Show all working out in the space provided.

Question No.	Max. Points	Points Scored
1,2,3	**18**	
4,5	**16**	
6,7,8	**20**	
9,10	**12**	
11,12,13	**18**	
14,15,16	**14**	
TOTAL	**100**	

١) [4 points] Show that the given matrices are inverses of each other:

$$\begin{bmatrix} -1 & -2 \\ 3 & 4 \end{bmatrix}\begin{bmatrix} 2 & 1 \\ -\frac{3}{2} & -\frac{1}{2} \end{bmatrix}$$

٢) [4 points] The supply and demand equations for salt have estimated to be given by the equation

$$S = 0.6p + 0.3 \qquad D = -0.4p + 1.2$$

a) Find the market price.

b) What quantity of supply is demanded at this market price?

٣) [10 points] Graph the following system of linear inequalities $\begin{cases} 2x + y \geq 2 \\ 3x + 2y \leq 6 \\ x + y \geq 2 \\ x \geq 0 \\ y \geq 0 \end{cases}$

٤) [10 points] For the following linear programming problem, check to see if it is in standard form, if it isn't modify it, then introduce slack variables and set up the initial simplex tableaux. **Do not attempt to solve it.**

Maximize $P = 2x_1 + 3x_2 + x_3 + 6x_4$ subject to

$$\begin{aligned} -x_1 + x_2 + 2x_3 + x_4 &\le 10 \\ x_1 - x_2 + x_3 - x_4 &\ge -8 \\ x_1 + x_2 + x_3 + x_4 &\le 9 \\ x_1 \ge 0, \quad x_2 \ge 0, \quad x_3 \ge 0, \quad x_4 &\ge 0 \end{aligned}$$

٥) [6 points] If U = universal set $= \{a,b,c,d,e\}$ and if $A = \{a,b,c\}$, $B = \{a,c,f\}$ find

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

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

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

6) [8 points] In a survey of 125 college students the following was found about their reading habits of three newspapers.

60 read Arab Daily
40 read Saudi News
15 read Gulf Times
25 read Arab Daily and Saudi News
8 read Saudi News and Gulf Times
3 read Arab Daily and Gulf Times
1 read all three

Part a) Draw a Venn diagram in the box above to represent this information.

Part b) Use your Venn diagram to answer the following questions:

i) How many of read none of these newspapers? ……..

ii) How many read only the Arab Daily? …….

iii) How many read neither the Arab Daily nor the Saudi News?.....

٧) [6 points] Use the binomial theorem to fully expand the expression $(2x+3y)^5$

٨) [6 points] A jar contains a mixture of 5 green, 4 red, and 3 white balls.

a) If one ball is picked at random, what is the probability it is red?

b) If one ball is picked at random, what is the probability it is white?

٩) [8 points] In the experiment of tossing two fair dice, find the probability of the following events:

a) The sum of the faces is 4.

b) The sum of the faces is 6.

c) The sum of the faces is 4 or 6.

d) The sum of the faces is 4 and 6.

١٠) [6 points] If $P(A) = 0.35$ and $P(B) = 0.45$ find the following probabilities:

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

b) $P(\overline{B})$

c) $P(A \cup B)$ if A and B are mutually exclusive.

d) $P(A \cap B)$ if A and B are mutually exclusive.

e) $P(A \cup B)$ if $P(A \cap B) = 0.15$

f) $P(A \cap B)$ if $P(A \cup B) = 0.55$

١١) [4 points] The odds for Saudi Arabia to win the next FIFA World Cup have been quoted as 2 to 11. What is the **probability** that the Saudi team will win?

١٢) [8 points] In a survey of the number of brothers for a group of PSU students the following probability table was constructed:

Number of Brothers	0	1	2	3	4 or more
Probability	0.15	0.34	0.33	0.11	0.07

Find the probability of a student having:

a) 1 or 2 brothers

Ans. a).....

b) 1 or more brothers

Ans. b)……

c) 3 or fewer brothers

Ans. c)……

d) 3 or more brothers

Ans. d)……

e) Fewer than 2 brothers

Ans. e).....

f) Not even 1 brother

Ans. f).....

g) 1, 2, or 3 brothers

Ans. g).....

h) 2 or more brothers

Ans. h).....

١٣) [6 points] A fair coin is tossed 6 times.

a) Find the probability that exactly 2 heads appear.

b) Find the probability that no heads appear.

c) Find the probability that exactly 4 tails appear.

١٤) [6 points] A box ready for shipment contains 20 clocks, out of which 8 are defective. All the clocks look the same and have an equal probability of being picked. Four clocks are selected at random and placed in a smaller box.

a) What is the probability that all four are defective?

b) What is the probability that exactly three are defective?

c) What is the probability that at least three are defective?

١٥) [6 points] A probability experiment considers a three-child family.
a) Write the sample space, S, for this family.

b) Let E be the event, "The family has exactly 1 girl," and let F be the event, "The first child is a boy." What is the probability that the family has one girl given the first child is a boy?

١٦) [4 points] If $P(E) = 0.4$ and $P(F) = 0.6$, and $P(E \cup F) = 0.7$, what is $P(E|F)$? Are E and F independent?