

PRINCE SULTAN UNIVERSITY

MATH 101, Term 162, Final Exam

May 13th, 2017



Start: 8:30 AM

End: 11:30 AM

Name: _____

I.D. : _____

Section: _____

Dr. Nabil	Dr. Bahaeldin	Mr. Khalid

1. Answer all questions.
2. This exam consists of 6 pages, 14 questions
3. You can use a calculator, NOT a mobile phone.
4. No talking during the test.
5. Show all working out in the space provided.

Question No.	Max. Points	Points Scored
1,2,3	21	
4,5	14	
6,7,8,9	26	
10,11,12	22	
13,14	17	
TOTAL	100	

Problem 1(5 points): Find t so that the line that passes through $(3, 5 - t)$ and $(1, 7)$ is parallel to the line $3x + 6y = 8$

Problem 2(6 points): The supply (S) and demand (D) equations for salt have been estimated to be given by the equations, where p is price: $S = 0.8p + 0.5$ and $D = -0.4p + 1.5$ Find the market price (equilibrium price.)

Problem 3(10 points):

a) Find the inverse of the matrix $A = \begin{bmatrix} 1 & 1 & 2 \\ 2 & 1 & 0 \\ 1 & 2 & 2 \end{bmatrix}$

b) Solve the following system by using the inverse matrix $\begin{cases} x + y + 2z = 2 \\ 2x + y = 5 \\ x + 2y + 2z = 1 \end{cases}$

Problem 4(6 points): Stars appliances has a sale on microwaves and stoves. Each microwave requires 2 hours to unpack and set up, and each stove requires 1 hour. The storeroom space is limited to 50 items. The budget of the store allows only 80 hours of employee time for unpacking and set up. Microwaves sell for \$300 each, and stoves sell for \$200 each. How many of each should the store order to maximize revenue? ? **Write the Linear Programing Problem (Objective function and constraints) that represents this problem. DONOT SOLVE**

Problem 5(8 points): Maximize $P = 2x_1 + 3x_2$ subject to the constraints:

$$x_1 + x_2 \leq 8$$

$$2x_1 + x_2 \geq 10$$

$$x_1 \geq 0, x_2 \geq 0$$

Problem 6(6 points): A typical pack-a-day smoker spends about 300 SR per month on cigarettes. Suppose the smoker spends that amount each month in a savings account at 5% interest compounded monthly. What would the account be worth after 30 years?

Problem 7(8 points): What rate of interest is required to double an investment in 5 years if the interest is compounded:

a) Quarterly?

b) Continuously?

Problem 8(6 points): License plates consist of two letters of the alphabet followed by five numbers.

a) How many license plates are possible to have? (using the English alphabet)

b) How many plates are possible to have if the letters are all different (letters and numbers are not repeated)?

Problem 9(6 points): A ball is picked at random from a box containing 8 white, 7 red, 13 blue, and 4 green. Find the probability of each event.

a) White ball is picked.

b) White ball or red ball is picked.

c) Neither red nor green ball is picked.

Problem 10(6 points): A student is taking courses in both Arabic and Physics. He estimates his probability of passing Arabic at (0.4) and English at (0.6) and estimates his probability of passing at least one of them at (0.8). What is his probability of passing both courses?

Problem 11(8 points): Given that A and B are subsets of the universal set U with $n(U) = 100$, $n(A) = 35$, $n(B) = 70$ and $n(A \cup B) = 85$. Find

a) $n(A \cap B)$

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

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

d) Are A and B mutually exclusive? Why?

Problem 12(8 points): Let A and B be events of a sample space S and let $P(A) = 0.5$, $P(B) = 0.3$, and $P(A \cap B) = 0.1$. Find the probabilities of each of the following events:

a) $P(A \text{ or } B)$

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

c) $P(\text{neither } A \text{ nor } B)$

d) $p(\overline{A} \cap \overline{B})$

Problem 13(8 points): The following table shows the results of a survey constructed by a perfume producer

	Like Perfume (L)	Did not like Perfume (D)	No opinion (N)
Male (M)	123	78	56
Female (F)	234	24	15

Find the following:

- a) How many are male and like Perfume.
- b) How many are female or did not like Perfume
- c) The probability a person picked at random is male.
- d) The probability a person picked at random is a male and did not like Perfume.

Problem 14(9 points): A baseball player has a 0.25 batting average.

- (a) What is the probability that the player will have at least 1 hit in 6 times at bat?
- (b) What is the probability that the player will have exactly 4 hits in 7 times at bat?
- (c) What is the probability that the player will have at most 2 hits in 5 times at bat?