

Dr. Latif and Raja Latif and Muhammad Latif and Abdul Latif

Contents

Marks: 175; Time: 180 Minutes

NAME:.....

I.D.#:

--	--	--	--	--	--

SERIAL# SECTION #: (check one)

		1	✓	2
--	--	---	---	---

NOTE: SHOW ALL STEPS OF THE SOLUTION.

NO FULL CREDIT WITHOUT COMPLETE SOLUTION.

The questions are not in any order of difficulty at all.

Only the nonprogramable calculators are allowed.

In case of Multiple Choice Questions check or Circle only the one right choice after complete solution of it. You may have no credit without complete solution.

Write the simplified answer of question at the specified place at the end of each question.

You are not allowed to use any Mobile phone or Pager during the examination.

Count that you have THIRTY-FIVE Questions in this Examination.

Qn.	Right	Student	Marks	Remark
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				

30				
31				
32				
33				
34				
35	.....	.....	.....	.....
36				

Q.1.29LGR27.

(Marks : 6). (Break – Even Analysis) Producing x units of calculators costs $C(x) = 5x + 20$;

Revenue is $R(x) = 15x$, where $C(x)$ and $R(x)$ are in dollars.

a. What is the break-even quantity ?

Quantity: = _____ Calculators.

b. What is the profit from 100 units (Calculators)?

Profit: = _____ Dollars.

c. How many units (calculators) will produce a profit of \$500?

Quantity: = _____ Calculators.

Q.2.(Marks : 6) . 59LGR35. (Production) A company produces two models of bicycles, model 201 and model 301.

Model 201 requires 2 hours of assembly time and model 301 requires 3 hours of assembly time.

The parts for model 201 requires \$18 per bike and

the parts for model 301 requires \$27 per bike.

If a company has a total of 34 hours of assembly time and

\$335 available per day for these two models, how many of each should be made in a day to use up all available time and money?

If it is not possible, explain why not?

Solution: Let x = Number of Model 201 bikes,

y = Number of Model 301 bikes.

System of Equations:

Solution.

x = _____

y = _____

Model 201 Bicycles: _____

Model 301 Bicycles: _____

Q.3.(Marks : 6). **74LGR45.** (*Transportation*) A knitting shop orders yarn from three suppliers in Toronto, Montreal, and Ottawa.

One month a shop ordered a total of 100 units of yarn from these suppliers.

The delivery costs were \$80, \$50, and \$65 per unit for the orders from Toronto, Montreal, and Ottawa, respectively, with total delivery cost of \$5990.

The shop ordered the same amount from Toronto and Ottawa. How many units were ordered from each supplier?

Set up the set of linear equations (without solution) in order to find the number of units ordered from each supplier.

Let x = the number of units ordered from the supplier in Toronto,

y = the number of units ordered from the supplier in Montreal,

z = the number of units ordered from the supplier in Ottawa.

The system of Equations:

Q.4.(Marks : 6)

272B4.3R36. (*BUSINESS : Resource Allocation*) A furniture shop manufactures wooden desks, tables, and chairs.

The number of hours to assemble and finish each piece are shown in the table,

together with the number of hours of skilled labor available for each task.

If the profit is \$80 for each desk, \$84 for each table, and \$68 for each chair,

how many of each should the shop manufacture to obtain the greatest possible profit?

	Assembly	Finishing
Desk	2 hours	2 hours
Table	1 hour	3 hours
Chair	2 hours	1 hours
Labor Available	200 hours	150 hours

(Set up the linear programming problem without solution)

Let x = number of desks manufactured .

y = number of tables manufactured.

z = number of chairs manufactured.

Objective function : Maximize or Minimize (Check One)

P=-----

Constraintts

{ -----

 $x \geq 0,$
 $y \geq 0,$
 $z \geq 0$

Q.5.(Marks : 6) **297BR2.** Find the dual without solution of the following problem:

$$\text{Minimize } C = 24y_1 + 20y_2 + 12y_3$$

Subject to the constraints

$$\left\{ \begin{array}{l} 2y_1 + 5y_2 + 3y_3 \geq 3 \\ -3y_1 + 2y_2 + 2y_3 \geq 5 \\ y_1 \geq 0, y_2 \geq 0, \text{ and } y_3 \geq 0 \end{array} \right.$$

Q.6.(Marks : 5). **41HB2.6** When electric blenders are sold for p dollars a piece, manufacturers will supply $\frac{P^2}{10}$ blenders to local retailers, while the local demand will be $60 - p$ blenders.

At what market price will the manufacturers supply of blenders be equal to the consumers demand?

Price:..... Dollars.

Q.7.(Marks : 5). **428HB2.5** How much money should Julie invest at 7% compounded quarterly if she wants \$5000 for a trip to Europe when she graduates from college in three years?

Q.8.(Marks : 5). **434HB23** How much should you invest now at an annual interest rate of 8% compounded continuously so that your balance 15 years from now will be \$20000?

Investment: Dollars

Present Investment:..... Dollars.

Q.9.(Marks : 6). **439HB3.3.** In order to save \$10000 for his retirement,

Bob wants to put a fixed amount by the end of each month into a savings amount that pays interest at an annual rate of 6% compounded monthly.

If he plans to save in this way for 20 years, how much should his monthly payments be to achieve his goal?

Q.10.(Marks : 5). **36HB19.** A furniture manufacturer can sell dining room tables for \$70 each.

The manufacturer's total cost consists of a fixed overhead of \$8000 plus production costs of \$30 per table.

How many units must the manufacturer sell to break even?

Monthly Payment:..... Dollars.

Number of Units:.....

Q.11.(Marks : 4). **382HB3.3** In a survey of dental costs in the Claremont area, 6 dentists were selected at random and the amount each charged for a routine office visit was recorded.

Find the Range, Mode, sample mean \bar{X} , and the sample Median, for the resulting data: \$25, \$23, \$34, \$41, \$38, \$29.

Range: =

Mode: =

Sample Mean \bar{X} =

Sample Median: =

Q.12.(Marks : 6). **410HB5.** Thirty-five percent of the people in a certain area are left-handed.

Suppose 40 people in the area are picked for survey.

Suppose that X is the number of left-handed people picked for the survey.

Use the Normal approximation to the Binomial Distribution to find the probability that not more than (or at most) 15 people in the sample of 40 people are left handed.

Probability $P(X \leq 15) =$

Q.13.(Marks : 3). **375HB5.** Thirty students at a small college have heights that fall into the categories indicated in the following table:

<i>Height (inches)</i>	<i>Frequency</i>
80 – 84	2
75 – 79	4
70 – 74	11
65 – 69	9
60 – 64	4

Find the approximate sample mean height of these students.

Q.14.(Marks : 5). **348A8.5L25.** (*Test – panel Selection*) A sample of 6 persons is selected for a test from a group containing 20 smokers and 10 nonsmokers. What is the probability that the sample contains exactly 4 smokers.

Probability: =

Q.15.(Marks : 5). **281HB3.10** The probability that it will rain in Fransisco tomorrow is 0.3, and the probability it will rain in Bakersfield is 0.4.

The probability that it will rain in both cities tomorrow is 0.2.

What is the probability that it will rain in at least (minimum) one of the two cities?

Probability: =

Q.16.(Marks : 7). **85A2.4L12.** A rocket is shot vertically upwards from the ground with an initial velocity of 128 feet per second. The rocket is at a height h after t seconds of launching, where $h = 128t - 16t^2$.

(a) After what time will the rocket be at a height of 192 feet above the ground?

Time: =

(b) When will the rocket return to the ground?

Time:=..... Seconds.

(c) Find the maximum height the rocket will reach.

Max. height: $h =$ feet.

Q. 17. (Marks : 6). **24.87AL35.**
(*Manufacturer's Profit*) The manufacturer of a certain product can sell all she can produce at a price of \$20 each.

It costs her \$12.50 to produce each item in materials and labors,

and she has additional overhead costs of \$7000 per month in order to operate the plant.

Find the number of units she should produce and sell to make a profit of \$5000 per month.

Q.18.(Marks : 6) . **101A3.2L28.** (*Manufacturer's Profit*) A stereo manufacturer can sell all the units produced at a price of \$150 each.

Weekly fixed costs are \$15,000 and the units cost \$100 each in materials and labor. Find the (minimum) number of stereos which must be manufactured and sold each week to obtain a weekly profit AT LEAST (Minimum) \$1000.

Number of Units: =

Minimum Number of Stereos: =

Q.19.(Marks : 6). **142A4.3L10.**
(Demand Relation) A television manufacturer finds that at \$500 per television set, sales are 2000 sets per month.

However, at \$450 per set, sales are 2400 units.
Determine the demand equation, assuming it to be linear.

Q.20.(Marks : 6). **162A4.4L8** (Nonlinear Break-even Analysis) The cost of producing x items per day is given in dollars by

$$y_c = 2000 + 100\sqrt{x}.$$

If each item can be sold for \$10, determine the break-even point.

Demand Equation: =

Quantity: $x =$

Q.21.(Marks : 3). **335A8.3L25.** (*Smoking and Cancer*) The probability that a person over 50 years of age is a smoker in a certain community is $\frac{3}{5}$ and the probability that a person over 50 years of age has a cancer is $\frac{1}{20}$.

The probability that a person over 50 years of age will be a smoker and have a cancer is $\frac{1}{25}$.

Are smoking and cancer disorders independent events?

YES OR NO (check one).

Explanation:

Q.22.(Marks : 6).

166AL42. (*Market Equilibrium*) The demand and supply equations of a certain commodity are given by $p + x^2 = 20$ and $3p - 8 = x$ respectively, where p is the price in dollars and x is the quantity sold in units of thousands.

Find the equilibrium price and quantity?

Price $p = \dots\dots\dots$ Dolaars.

Quantity $x = \dots\dots\dots$ units of thousands.

Q.23.(Marks : 3)**349AL37.** (*Monkey Business*)
If a monkey playing with a typewriter types out 11 letters at random, what is the probability that it will spell out the word *Shakespeare*?

(A) $\frac{11}{26^{11}} = (11) (26^{-11})$

(B) $\frac{11}{26} = (11) (26^{-1})$

(C) $\frac{1}{26^{11}} = (26)^{-11}$

(D) $\frac{1}{11} = (11)^{-1}$

(E) $\frac{11!}{26!}$

(F) $\frac{1}{11^{26}} = (11)^{-26}$

(G) $\frac{11}{26^7} = (11) (26^{-7})$

(H) $\frac{11}{26!}$

(K) $\frac{1}{(11)(26)}$

(M) $\frac{11}{11+26} = \frac{11}{37}$

(N) **None of the above choices is correct and right answer is : =.....**

MCQ.24.(Marks : 3). **A box contains 8 light bulbs TWO of which do NOT work.**

If TWO bulbs are selected at random, then the probability of selecting BOTH bulbs that do NOT work is

(A) $\frac{1}{4}$

(B) $\frac{3}{4}$

(C) $\frac{1}{28}$

(D) $\frac{11}{28}$

(E) $\frac{7}{28}$

(F) $\frac{1}{128}$

(K) $\frac{2}{28}$

(N) **NO ABOVE CORRECT CHOICE**

and the correct answer is:.....

MCQ25. (*Marks : 3*). How many different **FOUR-letter "words"** can be formed from the letters of **MARKET**? (The word may or may not be meaningful and no letter in the word is repeated)

- (A) 840
- (B) 21
- (C) 720
- (D) 24
- (E) 30
- (F) 24
- (K) 10

(N) NO ABOVE CORRECT CHOICE

and the correct answer is:.....

MCQ26. (*Marks : 3*). How many ways can 2 men, 2 women, and 2 children be selected from 6 men, 4 women, and 3 children?

- (A) 13
- (B) 72
- (C) 2160
- (D) 270
- (E) 676
- (F) 104
- (G) $(6!).(3!).(2!)$
- (E) 576
- (N) NO ABOVE CORRECT CHOICE

and the correct answer is:.....

MCQ27. (Marks : 3) A jar contains 5 RED, 4 BLACK, 7 PURPLE, and 9 GREEN marbles.

If a marble is drawn at random, what is the probability that the marble is RED or BLACK?

- (A) 0.32
- (B) 0.72
- (C) 0.64
- (D) 0.44
- (E) 0.54
- (F) 0.84
- (G) 0.95
- (H) 0.48
- (K) 0.24
- (M) 0.36

- (N) NO ABOVE CORRECT CHOICE

MCQ28. (Marks : 4). From a group of 10 MEN and 10 WOMEN, TWO people are randomly selected to form a committee.

If X is the number of WOMEN on the committee,

then the probability $P(X = 2)$ is equal to:

- (A) $\frac{1}{5}$
- (B) $\frac{5}{38}$
- (C) $\frac{9}{38}$
- (D) $\frac{7}{380}$
- (E) $\frac{17}{380}$
- (N) NO ABOVE CORRECT CHOICE

and the correct answer is:.....

MCQ29. (Marks : 4) The life X (in hours) of light bulbs of a certain brand is NORMALLY distributed with mean $\mu = 1200$ and standard deviation $\sigma = 100$.

Find the PROBABILITY p that such bulbs will burn MORE THAN 1250 hours.

[Find $p = P(X > 1250)$].

- (A) $0.10 \leq p < 0.16$
- (B) $0.16 \leq p < 0.22$
- (C) $0.22 \leq p < 0.28$
- (D) $0.28 \leq p < 0.34$
- (E) $0.34 \leq p < 0.40$
- (F) $0.40 \leq p < 0.50$
- (G) $0.54 \leq p < 0.60$
- (K) $0.64 \leq p < 0.70$
- (L) $0.74 \leq p < 0.84$
- (M) $0.84 \leq p < 0.95$
- (N) NO ABOVE CORRECT CHOICE

and the correct answer is:.....

Q.30. (Marks : 3). Find the STANDARD DEVIATION for the following set of numbers through completing the following table.

Number	Derivation from Mean $(x - \bar{x})$	Square of Deviation $(x - \bar{x})^2$
241		
248		
251		
257		
252		
287		
Total		

$$\text{Mean} = \bar{x} = \frac{1536}{6} \equiv 256.$$

$$\text{Standard Deviation} = s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

=

Q.31. (Marks : 2). The numbers of immigrants to the United States (in thousands) from selected parts of the world in 1990 are shown in the table.

REGION	IMMIGRANTS
EUROPE	145.4
ASIA	357.0
CANADA	15.2
MEXICO	213.8
OTHER AMERICA	210.3
TOTAL	941.7

Note that

$$\text{Mean} = \bar{x} = \frac{941.7}{5} = 188.3 \text{ thousand}$$

Standard Deviation =

$$s = \sqrt{\frac{61397.96}{4}} \equiv 123.9.$$

Are any of the data more than 1 (one) standard deviation from the mean?

YES or NO (Check one)

If so, which ones:(Check or Circle the corresponding Regions).

Europe

Asia

Canada

Mexico

Other America

Q.32. (Marks : 7). 474T9.1B18. Demand. The following table for a small car rental company gives the probability that x cars are rented daily:

$X = x$	$P(X = x)$
0	0.05
1	0.10
2	0.15
3	0.25
4	0.20
5	0.15
6	0.1

(a) Determine the expected daily demand of their cars.

(b) Find the Variance of X .

(c) Find the following probabilities:

(i) $P(X \leq 3.5) = \text{-----}$

(ii) $P(X < 2) = \text{-----}$

(iii) $P(X \neq 0) = \text{-----}$

(iv) $P(2 \leq X < 5) = \text{-----}$

(v) $P(X = 2 + 6) = \text{-----}$

Q.33.(Marks : 8). **303HB5.1.** The table below shows blood pressure levels and smoking habits for a group of 300 middle-aged men.

	<i>Non-smoker</i>	<i>Moderate Smoker</i>	Heavy Smoker	Total
<i>Normal blood pressure</i>	81	84	27	192
<i>High blood pressure</i>	21	51	36	108
Total	102	135	63	300

Suppose someone is selected at random from this group.

Find the probability that the selected person:

(a) Is a heavy smoker.

Probability: =

(b) Has high blood pressure.

Probability: =

(c) Has high pressure and is a heavy smoker.

Probability: =

(d) Has high blood pressure given that he is a heavy smoker.

Probability: =

Q.34.(Marks : 5) Consider the following initial tableau:

	x_1	x_2	x_3	s_1	s_2	s_3	F	$const$
s_1	3	2	-1	1	0	0	0	4
s_2	1	-2	7	0	1	1	0	3
F	-2	-4	7	0	0	0	1	0

Convert this table into a new tableau by PIVOTING on the entry 2 in the first row and second column.

ROW OPERATIONS: $aR_1 \rightarrow R_1$
 $bR_1 + R_2 \rightarrow R_2$
 $cR_1 + R_3 \rightarrow R_3$

Find the values of $a, b,$ and $c.$

$a = \dots, b = \dots, c = \dots$

Complete the following matrix (table).

	x_1	x_2	x_3	s_1	s_2	s_3	F	$const$
x_2	...	1	...	...	0	0	0	...
s_2	...	0	...	...	1	0	0	...
...
F	...	0	...	...	0	0	1	...

Q.35. (Marks:8). USE THE GEOMETRIC METHOD TO

MAXIMIZE $Z = 4x - 6y$

$$\text{subject to } \begin{cases} 3x - y \leq 3 \\ x + y \geq 5 \\ y \leq 7 \\ x, y \geq 0 \end{cases}$$

By SKETCHING AND SHADING THE FEASIBLE REGION R given in the above inequalities AND THEN IDENTIFYING THE CORNER POINTS to evaluate the Maximum Value of Z .

	y																				
	↑																				
	9																				
	8																				
	7																				
	6																				
	5																				
	4																				
	3																				
	2																				
	1																				
in	↘																				
ig	↗	↖	1	2	3	4	5	6	7	x											
or	ig	in																			

Corner Points (x, y)	Value of $Z = 4x - 6y$

Maximum Value of $Z = \dots\dots\dots$