

Question 1:

By using properties of arithmetic mean, find the missing age in the following set of four student ages.

Student	Age	Deviation from the Mean ($x_i - \bar{x}$)
A	19	-4
B	20	-3
C	?	1
D	29	6
		<u>8</u>
Answer:	24	

Question 2:

Write the suitable answer against each statement:

- $s = d/t$
- We travel 10 km at 60 km/h, than another 10 km at 20 km/h, what is our average speed? $t = 2h$ $s = \frac{10+10}{6+2} =$
Answer: 2.5 km/h \times
 - What is the suitable average of the annual percentage growth rate of profits in business corporate from the year 2000 to 2005 geometric mean
Answer: _____
 - The mean of 14 numbers is 6. If 3 is added to every number, what will be the new mean?
Answer: $6+3 = 9$ new mean = 9 \checkmark

Question 3:

If a student is ranked eight out of ten in a competition, what is the student's percentile rank?

$$\frac{x}{100} \times 100 = 8$$

$$x = 80 \quad \times$$

Question 4:

The mean of the number of sales of cars over a 3-month period is 87, and the standard deviation is 5. The mean of the commissions is \$5225, and the standard deviation is \$773. Compare the variations of the two.

<u>sales</u>	<u>comissions</u>
$c.v = \frac{s}{\bar{x}}$ $= \frac{5}{87} \times 100$ $= \frac{5}{87} \times 100$ $\approx 5.75\%$	$c.v = \frac{s}{\bar{x}}$ $= \frac{773}{5225} \times 100$ $= \frac{773}{5225} \times 100$ $\approx 14.8\%$

The commissions have higher variation than car sales, and thus less consistency.

Page 1 of 1

Quiz #02

Question #01

A shipment of 20 similar laptop computers to a retail outlet contains 3 that are defective. If a school makes a random purchase of 2 of these computers, find the probability distribution for the number of defectives. Also find Mean and Variance.

Solution:

Total

$$n = 20$$

defective

$$P = \frac{3}{20}$$

$$q = \frac{17}{20}$$

x = no. of defective

(2)

x	$P(x)$	$xP(x)$	$x^2 P(x)$
0	68/95	0	0
1	51/190	51/190	51/190
2	3/190	3/190	6/190

(4)

$$P(0) = \frac{\binom{3}{0} \binom{17}{2}}{\binom{20}{2}} = \frac{68}{95}$$

$$E(x) = \sum xP(x)$$

$$= 0 + \frac{51}{190} + \frac{3}{95}$$

$$= \frac{3}{10} = 0.3$$

$$P(1) = \frac{\binom{3}{1} \binom{17}{1}}{\binom{20}{2}} = \frac{51}{190}$$

$$P(2) = \frac{\binom{3}{2} \binom{17}{0}}{\binom{20}{2}} = \frac{3}{190}$$

$$\text{var}(x) = \sum x^2 P(x) - (E(x))^2$$

$$= \left(\frac{51}{190} + \frac{6}{95} \right) - \left(\frac{3}{10} \right)^2$$

$$= 0.2416$$

Question #02

An investment firm offers its customers municipal bonds that mature after varying numbers of years. Given that the cumulative distribution function of T , the number of years to maturity for a randomly selected bond, is

$$F(t) = \begin{cases} 0, & t < 1, \\ \frac{1}{4}, & 1 \leq t < 3, \\ \frac{1}{2}, & 3 \leq t < 5, \\ \frac{3}{4}, & 5 \leq t < 7, \\ 1, & t \geq 7, \end{cases}$$

Find

- (a) $P(T = 5)$
- (b) $P(T > 3)$
- (c) $P(1.4 < T < 6)$
- (d) $P(T \leq 5 | T \geq 2)$.

Solution:

$$\textcircled{a} \quad P(T = 5) = F(5) - F(4) \quad \textcircled{4}$$

$$= \frac{3}{4} - \frac{1}{2}$$

$$= \frac{1}{4}$$

$$\textcircled{b} \quad P(T > 3) = 1 - F(T \leq 3)$$

$$= 1 - \frac{1}{2}$$

$$= \frac{1}{2}$$

$$\textcircled{c} \quad P(1.4 < T < 6) = F(6) - F(1)$$

$$= \frac{3}{4} - \frac{1}{4}$$

$$= \frac{1}{2}$$

$$\textcircled{d} \quad P(T \leq 5 | T \geq 2) = \frac{P(2 \leq T \leq 5)}{P(T \geq 2)}$$

$$= \frac{F(5) - F(2)}{1 - F(2)} = \frac{\frac{3}{4} - \frac{1}{4}}{1 - \frac{1}{4}} = \frac{\frac{1}{2}}{\frac{3}{4}} = \frac{2}{3}$$

National University of Computer and Emerging Sciences, Lahore Campus



Course: Probability & Statistics
 Program: BSCS
 Duration: 1 - Hour
 Paper Date: Sep. 19, 2017
 Section: All
 Exam: Mid - 01

Course Code: MT206
 Semester: Fall-2017
 Total Marks: 30
 Weight: 15
 Page(s): 01
 Roll No: [REDACTED]

Instruction/Notes: Exchange of calculators and stationary is strictly prohibited. Attempt parts of same question together. If you think some information is missing or wrong make assumptions and clearly state them.

Question 1: (08 marks): The following numbers represent the composite scores for 50 students of a certain college:

93	77	67	72	52	83	66	84	59	63	68	76	85
75	<u>97</u>	84	73	81	42	61	51	91	87	58	45	73
34	54	71	47	79	70	65	57	90	83	75	42	93
58	69	82	<u>6</u>	71	60	38	81	74	69	65		

- a) Organize the data into a frequency distribution using 10 as a class interval and 30 as the starting point.
- b) Draw histogram also mention the shape of the distribution.
- c) Construct a stem and leaf display of the data and explain how does histogram and stem and leaf differs from each other.

Question 2: (10 marks): Goals recorded by two teams A and B in a football season were as follows:

No. of goals scored in a match ..	0	1	2	3	4
No. of matches: Team A	24	9	8	5	4
No. of matches: Team B	17	9	6	5	3

9 1 2 3 5

By calculating the coefficient of variation in each case, find which team may be considered as more consistent.

Question 3: (04 marks): From past experiences a stockbroker believes that under present economic conditions a customer will invest in tax-free bonds with a probability of 0.5, will invest in mutual funds with a probability of 0.4, and will invest in both tax-free bonds and mutual funds with a probability of 0.15. At this time, find the probability that a customer will invest: (a) in either tax-free bonds or mutual funds; (b) in neither tax-free bonds nor mutual funds.

Question 4: (08 marks): Police plan to enforce speed limits by using radar traps at 4 different locations within the city limits. The radar traps at each of the locations R_1 , R_2 , R_3 and R_4 will be operated 40%, 30%, 20%, and 30% of the time, and if a person who is speeding on his way to work has probabilities of 0.3, 0.2, 0.4, and 0.1, respectively, of passing through these locations: (a) What is the probability that he will receive a speeding ticket? (b) What is the probability that he passed through the radar trap located at R_3 ?



Course:	Probability and Stats	Course Code:	MT 205
Program:	BS CS	Semester:	4th
Duration:	60 minutes	Total Marks:	40
Paper Date:	February 25; 2020	Weight	15%
Section:		Page(s):	02
Exam:	Mid Term - 1	Roll No:	
Instruction/Notes:	Attempt All the Questions. Question No. 1 should also attempt on the given answer sheet.		

Q1 — Multiple choice questions (Chose the correct answer)

Points (5)

- (i) Find the best suitable average for the following data containing salaries of 5 men in an industrial concern:
 Rs. 950, Rs. 2100, Rs. 1500, Rs. 100, Rs. 10,000
 (A) Arithmetic Mean
 (B) Median.
 (C) Mode
 (D) None of the above
- (ii) The main disadvantage of the range is that
 (A) It does not use all the observations in the calculation.
 (B) It can be influenced by an extreme values.
 (C) Both (A) and (B) are correct.
 (D) None of the above.
- (iii) Which of the following is not a measure of dispersion?
- (iv) The standard deviation is
 (A) The square of the variance.
 (B) Two times the Standard deviation.
 (C) Half the variance.
 (D) The square root of the variance.
- (v) The standard deviation of a frequency distribution is 10, the mean is 250, the median is 250 and the mode is also 250. The coefficient of skewness is
 (A) Zero.
 (B) Positive.
 (C) Negative.
 (D) None of the above.

Q2 (a) Use definitions of Arithmetic Mean (AM) and Geometric Mean (GM) to show (in general) that there are no real numbers a and b such that their geometric mean is 10 and arithmetic mean is 8.

Points (5)

- (b)** The sum of deviations of certain numbers of observations measured from 4 is 72, and the sum of deviations of observations measured from 7 is -3. Find the number of observations and their mean.
- (c)** An instructor in a large class gave an exam to 1,386 students. The lowest grade was a 41. The mean was 78 and the median was 80. The standard deviation was 11.93. The interquartile range (IQR) was 16.5. The max was 100. How many students scored above the 92nd percentile?

Points (5)

Points (5)

Q3 (a) A manufacturer of television tubes has two types of tubes A and B. The tubes have respective mean life-time $\bar{x}_A = 1495$ hours and $\bar{x}_B = 1895$ hours, and standard deviations $S_A = 280$ hours and $S_B = 310$ hours. Which tube has the greater (i) absolute dispersion, (ii) relative dispersion? Justify your answer.

Points (5)

National University of Computer and Emerging Sciences, Lahore Campus



Course Name:	Probability and Statistics	Course Code:	MT2005
Program:	BSE/BSCS/BDS	Semester:	Fall 2023
Duration:	60 Minutes	Total Marks:	40
Paper Date:	02-10-2023	Weight	15%
Section:	ALL SECTIONS	Page(s):	5
Exam Type:	MID-I	Moderator	Ms. Sarah Ahmad

Student : Name:

Ahmed Abdullah Roll No. 22L-7503 Section: BDS -3 A

Instruction/Notes:

- It is great to have choices in life but here all the questions are compulsory. So attempt all the subsections properly (Utilize the given space for each section) *Write Roll no. on each page. You can use the last page to extend any part if needed. No extra sheets allowed to attach for marking. However, you can demand for one rough sheet but do not attach it.
- We know, sharing is caring but here exchange of calculators is not allowed.. You can only use your own scientific calculator (programmable calculators are not allowed).
- Don't get panic. If you found any ambiguity in the data then do not ask anything to the invigilator, just make assumption and continue solving your paper.
- Believe in yourself & do not waste your time by looking in answer sheets of your fellows and copying them.
- Now if you regret not being prepared for this exam then Crying is allowed but do it so quietly in order to avoid disturbance.
- If you are thinking that it's a revenge. No, it is not. It is just an exam. We want you to be a most successful person in life. All the Best!

Don't Hurry. Don't Worry. Do your Best and Let it rest. ☺

CASE I: MULTIPLE CHOICE WARM-UP

[MARKS=05, CLO-1&2]

NOTE: Encircle the correct answer only. Overwriting/Cutting will be marked zero.

3

- A student has to take 7 or more courses before she can graduate. If none of the courses are prerequisites to others, which probability method would be used to determine how many groups of three courses she can select for the next semester?
 - a) Combination Rule ✓
 - b) Permutation rule
 - c) Simple probability
 - d) Conditional probability
 - e) None of these

7C3 \Rightarrow 35
- Consider the data of monthly salary of production unit managers having first and third quartile are 32 and 45 respectively with the median of 35 then distribution is
 - a) Not skewed at all
 - b) Skewed to the right ✓
 - c) Skewed to the left
 - d) Symmetric
 - e) None of these

(Positively skewed)
- Which one of these measures is unaffected by outliers?
 - a) Mean
 - b) Standard deviation ✓
 - c) Range
 - d) Interquartile range,
 - e) All of these

X

4. Absolute Zero exists in
- Nominal
 - Ordinal
 - Interval
 - Ratio
 - None of these

~~X~~

5. What is an average investment?
- 500
 - 33.33
 - 566.67
 - 540
 - None of these

~~(3.5)~~

$$\frac{300 \times 20 + 500 \times 60 + 900 \times 20}{100}$$

Frequency Distribution of Outcomes for an Investment		
Outcome \$	Frequency	Assumptions
300	20	Pessimistic
500	60	Moderately successful
900	20	Optimistic

CASE II: PRICES OF HARD DISK BY HP AND SANDISK

[Marks=20, CLO-1]

A marketing research firm wishes to compare the prices of Hard disk charged by two companies; HP and SanDisk. The research firm, using a standardized one-week purchase plan, makes identical purchases at ten of each company's stores. The stores for each company are randomly selected, and all purchases are made during a single week. The purchase expenses obtained at the SanDisk are given below. Compute five-point summary for the prices of SanDisk. It has been observed that average purchase price at HP stores is \$114.81 with variation of $s^2 = (1.84)^2$. Compare the two companies and comment on the consistency in prices by the two companies.

SanDisk	119.25	121.32	122.34	120.14	122.19	123.71	121.72	122.42	123.63	122.44
---------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------

SOLUTION:

$$\text{min} = 119.25 \$$$

$$\text{max} = 123.71 \$$$

$$\text{med} = 122.265 \$$$

$$Q_1 = 121.32 \$$$

$$Q_3 = 122.44 \$$$

$$\bar{x} = 121.916 \$$$

$$s^2 = (1.34)^2$$

Comparison:

On average, the value of HP device deviate from mean by 1.84\$, whereas the avg. price is lesser too. Whereas, the Sandisk deviate from by mean by 1.34\$ which is lesser yet the avg. price of disk is higher.

Consistent? 11242252132, Range.

119.25, 120.14, 121.32, 121.72, 122.19, 122.34, 122.42, 122.44, 123.63, 123.71

0004

SOLUTION CONTINUE CASE II:

Sorted Data for Sandisk

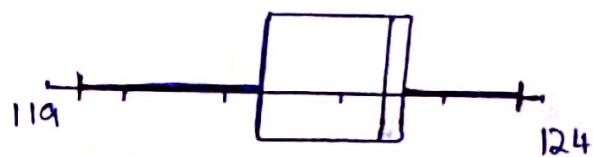
X	$X - \bar{X}$	$(X - \bar{X})^2$
119.25	2.66	7.07
120.14	1.77	3.133
121.32	0.596	0.355
121.72	-0.196	0.037
122.19	-0.274	0.075
122.34	-0.424	0.179
122.42	-0.506	0.256
122.44	-0.506	0.256
123.63	-1.714	2.92
123.71	-1.794	3.21
$\bar{X} = 121.916$		18.4

$$\frac{\sum (X - \bar{X})^2}{n} = 1.86$$

$$S^2 = 1.86$$

$$S^2 = (1.39)^2$$

Sandisk Box Plot:



Sandisk



HP

Comments:

HP prices are lesser, yet less consistent as the data deviates from mean whereas for Sandisk prices are high but less deviating

CV 1?

CV 2?

Page 3 of 5

Instruction/Notes:

Roll No.

Section:

Marks Obtained

38.5

- It is great to have choices in life but here all the questions are compulsory. So attempt all the subsections properly (Utilize the given space for each section)*Write Roll no. on each page. You can use the last page to extend any part if needed. No extra sheets allowed to attach for marking. However, you can demand for one rough sheet but do not attach it.
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17

Question 1:

[CLO-1, Marks: (4+4)+3+4+5=20]

Sorting through unsolicited e-mail and spam affects the productivity of software developers. A survey was conducted to monitor software developers to determine the unproductive time per day devoted to unsolicited e-mail and spam. The following frequency distribution of time in minutes consumed for this task is as follows.

a) Enlist the Relative Frequency and Cumulative Frequency in the blank columns provided below.

(mifi - \bar{v}) ²	Time in minutes	Frequency	RF (Part a)	CF (Part a)	mi. f
90.25	1-5	3	0.111	8	24
330.625	6-10	8	0.2	17	68
13340.25	11-15	13	0.2	27	130
12432.25	16-20	18	0.155	34	126
10100.25	21-25	23	0.1	39	115
4930.25	26-30	28	0.066	42	84
2652.25	31-35	33	0.044	44	66
552.25	36-40	38	0.022	45	38
47304		2634.83	45		655

FAST School of Computing

Roll no: _____ Deg.Program: _____ 4

Page 1 of 7

3691

b) Calculate average amount of time consumed in sorting unsolicited e-mail and spam.

$$\text{Mean} = \frac{\sum (x)}{n}$$

For grouped Data

$$\text{Mean} = \frac{\sum f_i(m_i)}{\sum f_i}$$
 where m_i midpoint of class
 $= \frac{655}{45}$

$$= 14.5 \text{ minutes - average}$$

(3)

c) Quantify the dispersion in the time devoted to unsolicited e-mail and spam.

Dispersion can be calculated through variance or standard deviation

$$S = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}}$$

for grouped data

$$S = \sqrt{\frac{\sum f_i(m_i - \bar{x})^2}{\sum f_i}}$$

$$\text{variance} = \frac{\sum f_i(m_i - \bar{x})^2}{\sum f_i}$$
$$= \frac{47304}{44}$$

$$= 1075.09$$

$$S = \sqrt{1075.09}$$

$$S = 32.7$$

Dispersion in time = 32.7 minutes

(1)

?

$$\sqrt{83.8889} \\ = 9.1591$$

Question 2:

[CLO-1, Marks: 8+(4+5+1)=18]

In the quest for ensuring the utmost reliability of their laptops, a leading manufacturer, specializing in Lenovo products, embarks on an investigation into the endurance of a particular battery variant. Within a carefully curated sample set, comprising 10 Lenovo laptop batteries, the recorded lifespan (hours) unfold as follows:

~~117, 118, 111, 125, 126, 171, 110, 122, 116, 132~~

- a) Show a five-point summary of the recorded lifespan (hours) of the batteries

Sorted Data

116	110
111	111
117	116
128	117
118	118
	122
	125
	126
	132
	171

$$\text{Min Value} = 110$$

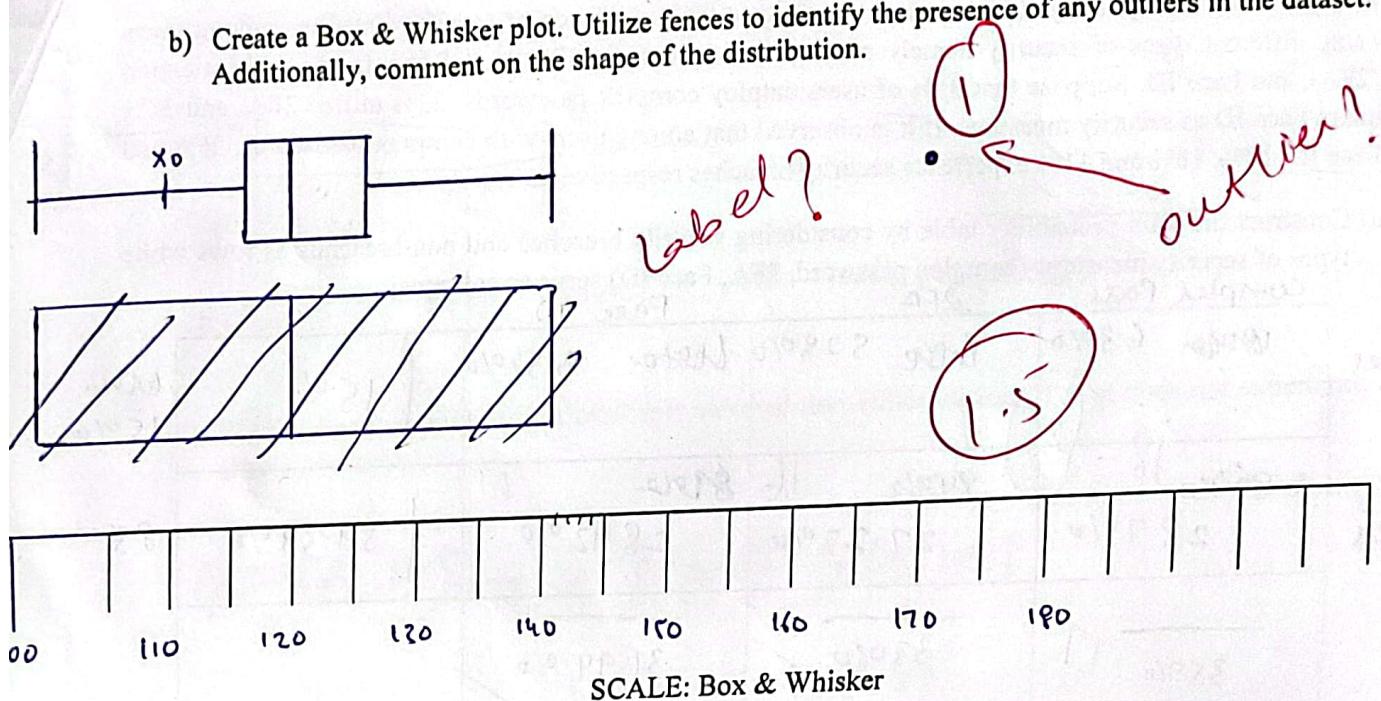
$$Q_1 = \frac{n+1}{4} = 3\text{rd value} = 116$$

$$Q_2 = \frac{n+1}{2} = \frac{\left(\frac{n}{2} + \frac{n}{2} + 1\right)}{2} = \frac{118 + 122}{2} = 120$$

$$Q_3 = \frac{n+1 \times 3}{4} = 8\text{th value} = 126$$

$$\text{Max Value} = 171$$

- b) Create a Box & Whisker plot. Utilize fences to identify the presence of any outliers in the dataset. Additionally, comment on the shape of the distribution.



$$IQR = Q_3 - Q_1 = 126 - 116 = 10$$

$$U.L = Q_3 + 1.5(IQR) = 126 + (1.5)(10) \\ = 141$$

$$L.L = Q_1 - 1.5(IQR) = 116$$

The distribution is very slightly skewed to the right, almost symmetric distribution

8

Question 3:

[CLO-2, Marks: 3+3+2+4=12]

In a network security analysis, researchers investigate the prevalence of security breaches among users using different types of security namely password complexity, utilization of two-factor authentication (2FA), and Face ID. Suppose that 35% of users employ complex passwords, 33% utilize 2FA, and 32% adopt Face ID as security measures. If it is observed that among users with complex passwords, 2FA and Face ID, 18%, 16% and 11% experience security breaches respectively.

- a) Construct the joint probability table by considering security breaches and non-breaches as rows while types of security measures (complex password, 2FA, Face ID) serve as columns.

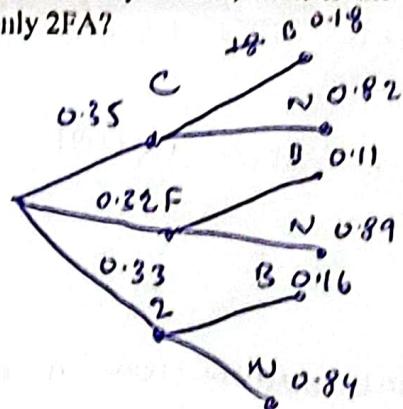
		Complex Pass	2FA	Face ID	
		18% 6.3%	5.28% 16%	3.52% 11%	15%
Breaches	Breaches	6.3%	5.28%	3.52%	15%
	NON Breaches	28.7%	27.72%	28.42%	84.39%
		35%	33%	32%	

- b) Suppose it is given that a randomly selected user experienced a security breach, what is the probability that the attempt was made on an account employing only 2FA?

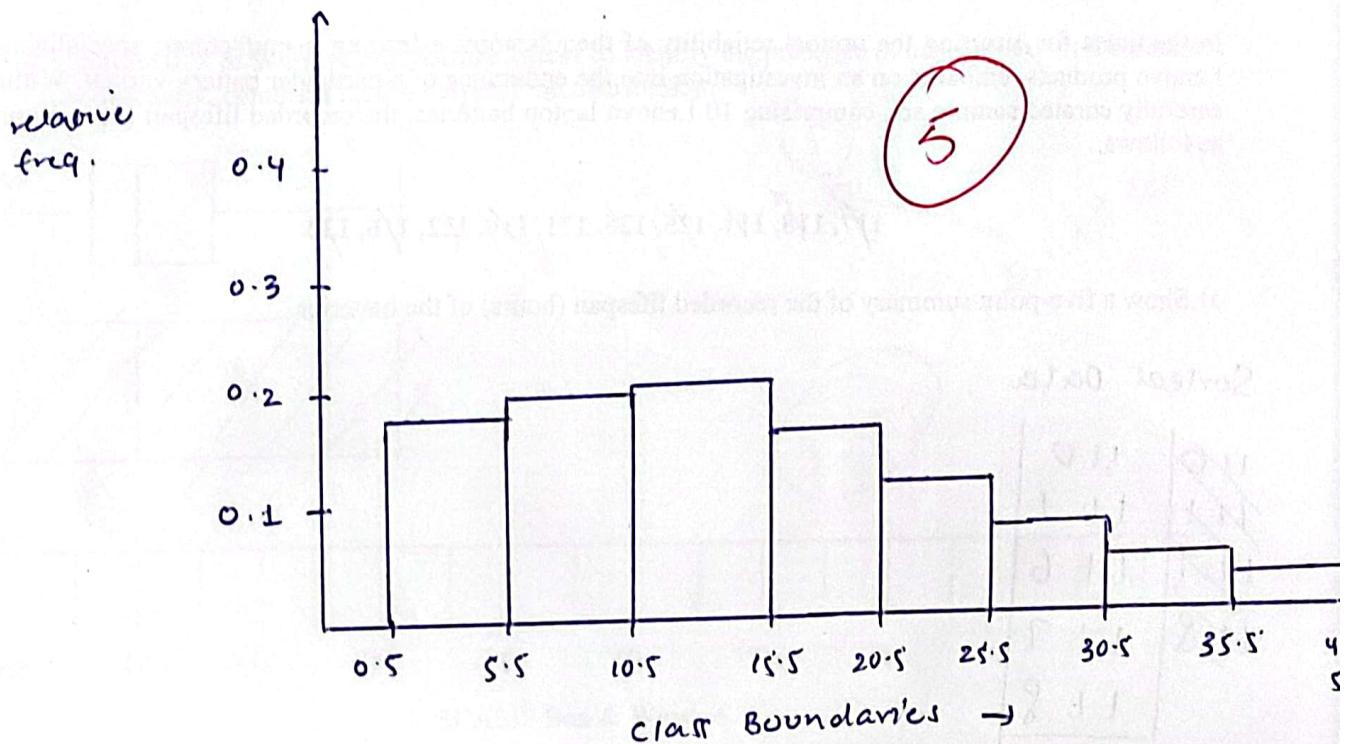
$$\begin{aligned}
 P(2|B) &= \frac{P(2 \cap B)}{P(B)} \\
 &= \frac{0.0528}{0.18 \times 0.35 + 0.11 \times 0.32 + 0.16 \times 0.33} \\
 &= 0.352
 \end{aligned}$$

$$P(2|B) = 35.2\% \text{ chance}$$

(3)



d) Construct a histogram using relative frequencies and comment on the shape of the distribution.



Comment: The distribution is

~~skewed~~ skewed to the right.

(already given in total)

National University of Computer and Emerging Sciences, Lahore Campus



	Course Name: Probability & Statistics	Course Code: MT2005
	Degree Program: BSCS/SE	Semester: Spring 2022
	Exam Duration: 60 Minutes	Total Marks: 40
	Paper Date: 22-03-22	Weight 15
	Section: ALL	Page(s): 2
	Exam Type: Midterm - I	

Student : Name: _____ **Roll No.** 2 **Section:** _____

- Instruction/Notes:**
1. Attempt all the questions on the answer book and show proper working.
 2. Use of Scientific calculator is allowed but Exchange of calculators or use of programmable calculators is not allowed.
 3. Students are not allowed to write anything on the question paper except roll number.
 4. If you have any ambiguity in the data then do not ask anything from invigilator, just make assumption and continue solving your paper.

Q 1.

[Points = 5 + 5]

(A) Choose the correct answer.

- i. Which of the following is not the characteristic of the arithmetic mean?
 - a) It is influenced by the extreme values .
 - b) Sum of the deviations taken from mean is zero.
 - c) Fifty percent of the observations will always larger than the mean.
 - d) Sum of squared deviations from mean is always minimum.
- ii. If a distribution has zero standard deviation, then which of the following is true?

a) All observations are positive	b) All observations are Negative
c) All observations are equal	d) Number of positive and negative values are equal.
- iii. If the original unit of the data is measured in kilogram (kg), then variance is measured in

a) Pounds	b) kg	c) kg^2	d) Dimensionless form	e) None of the above.
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- iv. Which of the following is not a measure of dispersion?

a) Range	b) Standard Deviation	c) Second Quartile	d) Coefficient of variation
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- v. If both the dependent and independent variables increase simultaneously, the coefficient of correlation will be in the range of

a) 0 to 1	b) 0 to -1	c) 1 to 2	d) None
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(B) Choose True / False in the following statements.

- i. Arithmetic mean is not affected by extreme values. True / False
- ii. The value which occurs most frequently in the data is known as median. True / False
- iii. If the distribution of the scores is symmetric, then median and mode will be same. True / False
- iv. If the distribution is skewed to left, then generally mean > median > mode. True / False
- v. The coefficient of variation is absolute measure of dispersion. True / False

Q 2.

[Points = 15 + 5]

(A) Find **Median**, **sixth Percentile** and **Mode** of the following data.

Earnings	18-25	25-40	40-46	46-50	50-60	60-70	70-75
Workers	35	25	28	30	20	18	5

(B) A manufacturer of laptops is interested in determining the life time of a certain type of laptop battery.

A sample of 10 Dell laptops battery having life in hours are:
117, 118, 111, 125, 126, 171, 110, 122, 116 and 132.

- i. Compute variation in data given related to batteries of Dell laptops.
- ii. If similar sample of 10 HP laptops batteries showed an average life in hours 121.7 with standard deviation of 19.8.

Suppose a person is interested to buying a laptop which is more consistent in its life time of a battery, which laptop would you suggest to buy and why?

Q 3.

[Points = 5 + 5]

(A) For 5 pair of observations, it is given that A.M. of X series is 2 and A.M. of Y series is 15. It is also known that $\sum xy = 242$, $\sum x^2 = 30$. Fit an appropriate curve for the data taking X as the independent variable.

(B) Following data is recorded on a random sample of 6 students who took admission in the university. The data includes their grades obtained in pre-admission exam and in the final exam in their first semester.

Pre Admission Test Grade	25	10	15	25	15	30
Final exam Grade	24	14	16	30	25	35

Calculate the co-efficient of correlation between grades of both exams and interpret its value.

Hint: Formula for coefficient of correlation is:

$$r = \frac{n \sum XY - \sum X \sum Y}{\sqrt{[n \sum X^2 - (\sum X)^2] [n \sum Y^2 - (\sum Y)^2]}}$$