Date __/__/__ Major Assignment

1) $x$ $N = 19$

24
25
28
31
33
33
36
42
42
(48) → 10th term
51
57
57
68
75
79
79
85

Median ⇒ $\frac{n+1}{2}$ th term

⇒ $\frac{19+1}{2}$ th term

⇒ $\frac{20}{2}$ th term

⇒ 10th term

**Median ⇒ 48**

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2) $x$ : 45, 39, 53, 45, 43, 48, 50, 45

$N = 8$

$\bar{x} \Rightarrow \frac{\Sigma x}{N}$

$\Rightarrow \frac{45+39+53+45+43+48+50+45}{8}$

$\bar{x} \Rightarrow \frac{368}{8}$

$\boxed{\bar{x} \Rightarrow 46}$

3)

Mean monthly salary of 10 members ⇒ Rs 1445
New member salary ⇒ Rs 1500

New mean ⇒ $\frac{1445 \times 10 + 1500}{10+1}$

$\Rightarrow \frac{15950}{11}$

New Mean ⇒ Rs 1450

**Mean ⇒ 1450 ₹**

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4)

| Height (cm) | No. of girls |
|---|---|
| 120 - 130 | 4 |
| 130 - 140 | 7 |
| 140 - 150 | 12 |
| 150 - 160 | 20 |
| 160 - 170 | 8 |
| TOTAL | 50 |

Highest Frequency = 20

$l_1 \Rightarrow 150$

$f_1 \Rightarrow 20$

$f_0 \Rightarrow 12$

$f_2 \Rightarrow 8$

$i \Rightarrow 10$

$$\text{Mode} \Rightarrow l_1 + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times i$$

$$\Rightarrow 150 + \frac{20 - 12}{2 \times 20 - 12 - 8} \times 10$$

$$\Rightarrow 150 + \frac{8}{40 - 20} \times 10$$

$$\Rightarrow 150 + \frac{8^4}{\cancel{20}} \times \cancel{10}$$

$$\Rightarrow 154$$

**Mode = 154**

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5) Range ⇒ 13.67

Largest Value ⇒ 70.08

Let the smallest value be $x$

Range ⇒ largest number - smallest number

$13.67 \Rightarrow 70.08 - x$

$x \Rightarrow 70.08 - 13.67$

$x \Rightarrow 56.41$

**Smallest Value ⇒ 56.41**

6) Arrange the numbers in ascending order we get,

11.4, 12.5, 12.8, 16.3, 17.8, 19.2

Number of observations $n \Rightarrow 6$

$$\text{Mean} \Rightarrow \frac{11.4 + 12.5 + 12.8 + 16.3 + 17.8 + 19.2}{6} \Rightarrow \frac{90}{6} \Rightarrow 15$$

| $x_i$ | $d_i \Rightarrow x_i - \bar{x}$ | $d_i^2$ |
|---|---|---|
| 11.4 | -3.6 | 12.96 |
| 12.5 | -2.5 | 6.25 |
| 12.8 | -2.2 | 4.84 |
| 16.3 | 1.3 | 1.69 |
| 17.8 | 2.8 | 7.84 |
| 19.2 | 4.2 | 17.64 |
| | | $\Sigma d_i^2 = 51.22$ |

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Standard Deviation $\Rightarrow$ $\sigma$ $\quad \sqrt{\frac{\Sigma d_i^2}{n}}$

$\Rightarrow \sqrt{\frac{51.22}{6}} \Rightarrow \sqrt{8.53}$

Hence, $\sigma \simeq 2.9$

7)

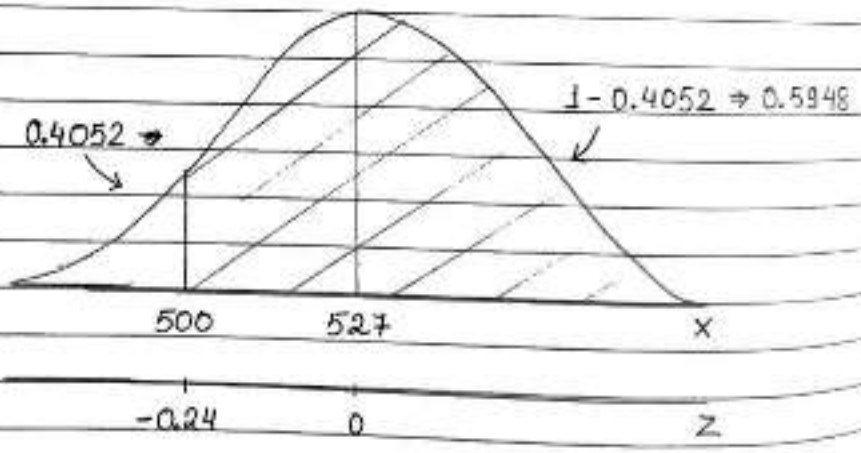
Normal Distribution $\quad Z = \frac{500 - 527}{112} = -0.24107$

$\mu = 527$

$\sigma = 112$

$Pr\{x > 500\} = Pr\{z > -0.24\} \Rightarrow 1 - 0.4052 =$

$\Rightarrow 0.5948$



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8) Normal Distribution

$$Z \Rightarrow \frac{240 - 266}{16} \Rightarrow -1.625$$

$$Z \Rightarrow \frac{270 - 266}{16} \Rightarrow 0.25$$

$\mu \Rightarrow 266$

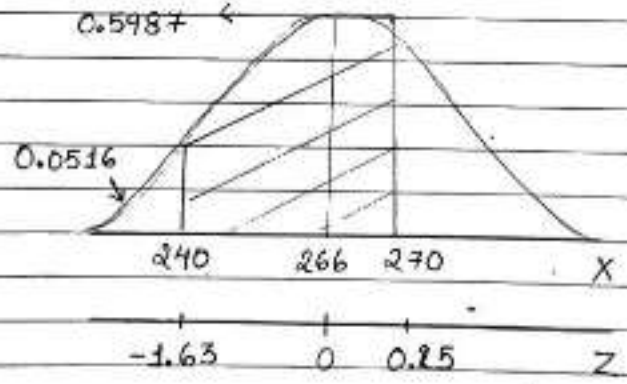
$\sigma \Rightarrow 16$

$P(240 < X < 270) = P(-1.63 < Z < 0.25)$

$P(-1.63 < Z < 0.25) = P(Z < 0.25) - P(Z < -1.63)$

$P(-1.63 < Z < 0.25) \Rightarrow 0.5987 - 0.0516$

$\Rightarrow 0.5471$



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9) Formula :

Five number summary includes five values.

1. Minimum value.
2. First quartile $Q_1$
3. Median $Q_2$
4. Third quartile $Q_3$
5. Maximum value.

Five number summary:

10, 50, 30, 20, 10, 20, 70, 30

Step 1: Arrange the numbers in ascending order:

10, 10, 20, 20, 30, 30, 50, 70

Step 2: Find the minimum value

Minimum ⇒ 10 [ Smallest value ]

Step 3: Find the maximum value

Maximum ⇒ 70 [ largest value ]

Step 4: Find the median

The median is the middle number in a sorted data set and N is the total number of elements.

If N is odd then the median is a single middle number, and if N is even then the median is the average of the two middle numbers

10, 10, 20, 20, 30, 30, 50, 70

$N \Rightarrow 8$ is even, so median is the average of the two middle number at position 4 and 5

We have $\frac{20+30}{2} \Rightarrow 25$

$\therefore$ Median $\Rightarrow$ 25

Step5: Place parenthese around the numbers above and below the median

{10, 10, 20, 20}, {30, 30, 50, 70}

Step6: Find Q1 by finding the median for lower half of data (left of the median)

10, 10, 20, 20

$N \Rightarrow 4$ is even, so median is the average of the two middle numbers at position 2 and 3

We have $\frac{10+20}{2} \Rightarrow 15$

$\therefore$ Q1 $\Rightarrow$ 15

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Step 7: Find Q3 by finding the median for upper half of data (right of the median)

30, 30, 50, 70

N ⇒ 4 is even, so median is the average of the two middle numbers at position 2 and 3

We have $\frac{30 + 50}{2} \Rightarrow 40$

∴ Q3 ⇒ 40

Step 8: Summary found in the above steps:

Minimum ⇒ 10
Q1 ⇒ 15
Median ⇒ 25
Q3 ⇒ 40
Maximum ⇒ 70

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10) $P(A \cup B) \Rightarrow P(A) + P(B) - P(A \cap B)$

$\Rightarrow 0.6 \Rightarrow 0.4 + p - P(A \cap B)$

$\Rightarrow P(A \cap B) \Rightarrow 0.4 + p - 0.6 \Rightarrow p - 0.2$

Since, A and B are independent events

$\therefore P(A \cap B) \Rightarrow P(A) \times P(B)$

$\Rightarrow p - 0.2 \Rightarrow 0.4 \times p$

$\Rightarrow p - 0.4p \Rightarrow 0.2$

$\Rightarrow 0.6p \Rightarrow 0.2$

$\Rightarrow p \Rightarrow \frac{0.2}{0.6} \Rightarrow \frac{1}{3}$

$\Rightarrow \boxed{p \Rightarrow \frac{1}{3}}$

11) According to the que.

The probability of Susan passing her both sets tests. 0.6

The probability of passing 1st test, is 0.8

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Now,
The probability of passing her 2nd test will be:

⇒ $P(2^{nd} \text{ test} / 1^{st} \text{ test}) \Rightarrow \frac{0.6}{0.8}$

$\Rightarrow \underline{0.75}$

(12) Let A ⇒ first die is 5

Let B ⇒ total of two dice is greater than 9

$P(A) \Rightarrow \frac{1}{6}$

Possible outcomes for A and B: {(5,5), (5,6)}

$P(A \text{ and } B) \Rightarrow \frac{2}{36} = \frac{1}{18}$

$P(B|A) \Rightarrow \frac{P(A \cap B)}{P(A)}$

$\Rightarrow \frac{1}{18} \times 6$

$\Rightarrow \frac{1}{3}$

13) No. of outcomes per bin ⇒ 10
Since it is a 3-digit no

$P \Rightarrow 10 \times 10 \times 10$

$P \Rightarrow 1000$

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14) P (Democrat or Republican) = P(Democrat) + P(Republican)

$\Rightarrow \frac{13}{39} + \frac{20}{39}$

$\Rightarrow \frac{33}{39}$

$\Rightarrow \frac{11}{13}$