Major Assignment (Statistics)

Q1 $n = 19$

$x_i = \{24, 25, 28, 31, 33, 33, 36, 42, 42, 48, 51, 57, 57, 68, 75, 79, 79, 79, 85\}.$

Since, no. of terms (n) ~~are~~ in odd

$\therefore$ median $= \left(\frac{n+1}{2}\right)^{th}$ term

median $= \left(\frac{19+1}{2}\right)^{th}$ term

median $= (10^{th})$ term

Ans $\boxed{\text{median} = 48}$

Q2 $n = 8$

$x_i = \{45, 39, 53, 45, 43, 48, 50, 45\}$

$$\text{Mean} = \frac{45 + 39 + 53 + 45 + 43 + 48 + 50 + 45}{8}$$

$$\text{Mean} = \frac{368}{8}$$

Ans $\boxed{\text{Mean} = 46}$

DATE / /

PAGE

Q3

$$\text{Mean } (\overline{X}) = \frac{\sum_{i=1}^{i=n} x_i}{n} = \frac{x_1 + x_2 \ldots x_n}{n}$$

$$\overline{X} = \frac{\sum_{i=1}^{n=11} x_{11}}{11} = \frac{\sum_{i=1}^{n=10} x_{10} + 1500}{11}$$

$$\left(\text{since, } x_{11} = 1500\right)$$

$$\overline{X} = \frac{14450 + 1500}{11}$$

$$\boxed{\overline{X} = 1450} \text{ Ans}$$

DATE / /

PAGE

Q4 $$\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$

Since, highest frequency is 20. Therefore the corresponding modal class is 150-160.

Lower limit = l = 150
Size of class interval = h = 10
Frequency of modal class = f_1 = 20
Frequency of class preceeding = f_0 = 12
Frequency of class succeeding = f_2 = 8

$$\text{Mode} = 150 + \left(\frac{20-12}{2\times20-12-8}\right) \times 10$$

$$\text{Mode} = 150 + \left(\frac{8}{20}\right) \times 10$$

$\boxed{\text{Mode} = 154}$ Ans

DATE / /
PAGE

Q5

Range = Largest value − Lowest value
Range = 70.08 − 13.67
$\boxed{\text{Range} = 56.41}$ Ans

Q6

$\mu = \dfrac{17.8 + 19.2 + 16.3 + 12.5 + 12.8 + 11.4}{6}$
(Mean)

$\mu = 15$

x_i	$x_i - \mu$	$(x_i - \mu)^2$
17.8	2.8	7.84
19.2	4.2	17.64
16.3	1.3	1.69
12.5	−2.5	6.25
12.8	−2.2	4.84
11.4	−3.6	12.96

$\sigma = \sqrt{\dfrac{\sum_{i=1}^{8} (x_i - \mu)^2}{n}}$

$\sigma = \sqrt{\dfrac{7.84 + 17.64 + 1.69 + 6.25 + 4.84 + 12.96}{8}}$

$\sigma = \sqrt{6.4025}$

$\boxed{\sigma = 2.53}$ Ans

DATE / /

PAGE

Q7

$\mu = 527$

$\sigma = 112$

$P(X>500) = (500-527)/112$

$P(X>500) = -0.24$

$P(X>500) = 1 - 0.4052$

$\boxed{P(X>500) = 0.5948}$ Ans

DATE / /
PAGE

Q 8) $P(x_1 < x < x_2)$ $\mu = 266$, $\sigma = 16$

$P\left(\frac{(240-266)}{16} < x < \frac{(270-266)}{16}\right)$

$P\left(\frac{-13}{8} < x < \frac{1}{4}\right)$

$P\left(\frac{-13}{8} < x < \frac{1}{4}\right) = -P\left(\frac{-13}{8}\right) + P\left(\frac{1}{4}\right)$

$= P\left(\frac{1}{4}\right) - P\left(\frac{-13}{8}\right)$

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

$= 0.5987 - 0.0516$

$\boxed{P(240 < z < 270) = 0.5471}$ Ans

DATE / /
PAGE

Q9

$x = \{10, 50, 30, 20, 10, 20, 70, 30\}$

arranging in ascending order

$x = \{10, 10, 20, 20, 30, 30, 50, 70\}$

Minimum value = 10
Maximum value = 70
1st Quartile =

$\{10, \underbrace{10, 20}, 20\} \{30, 30, 50, 70\}$

$$\frac{10+20}{2} = 15$$

$\boxed{1^{st} \text{ Quartile} = 15}$

2nd Quartile =

$\{10, 10, 20, \underbrace{20, 30}, 30, 50, 70\}$

$$\frac{20+30}{2} = 25$$

$\boxed{2^{nd} \text{ Quartile} = 25}$

3rd Quartile =

$\{10, 10, 20, 20\} \{30, \underbrace{30, 50}, 70\}$

$$\frac{30+50}{2} = 40$$

$\boxed{3^{rd} \text{ Quartile} = 40}$

DATE / /
PAGE

Q10

$P(A) = 0.4$
$P(B) = p$
$P(A \cup B) = 0.6$
$P(A \cap B) = P(A) \cdot P(B)$

$P(A \cup B) = P(A) + P(B) - P(A) \cdot P(B)$
$0.6 = 0.4 + p - 0.4p$
$0.6 = 0.4 + 0.6p$
$0.2 = 0.6p$

Ans $\boxed{p = \frac{1}{3}}$

Q11

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

$P(A) = 0.8$
$P(B \cap A) = 0.6$

$P(B|A) = \frac{0.6}{0.8}$

$P(B|A) = \frac{3}{4}$

Ans $\boxed{P(B|A) = 0.75}$

Q12

Total outcomes:
$\{(5,1), (5,2), (5,3), (5,4), (5,5), (5,6)\}$
The outcomes with sum 9:
$\{(5,5), (5,6)\}$

$$\text{Probability} = \frac{2}{6}$$

Ans $\boxed{P = 1/3}$

Q13

No. of outcomes per bin = 10
Since it is a 3-digit no.

$P = 10 \times 10 \times 10$
$\boxed{P = 1000}$ Ans

Q 14

Total outcomes $= 20 + 13 + 6 = 39$

$P(\text{Independent}) = \frac{6}{39}$

$P(\text{Democrat}) = \frac{13}{39}$

$P(\text{Independent or Democrat})$

$= P(\text{Independent}) + P(\text{Democrat})$

$= \frac{6}{39} + \frac{13}{39}$

$= \frac{19}{39}$