PROB & STATISTICS

Assignment #01

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ROLL NO: 20K-0183

QUESTION 01

a)

i) Mean: $= \frac{(128+119+95+97+124+128+142+98+108+120+113+109+124+132+97+135+133+136+120+112+146+128+103+135+114+109+100+111+131+113+124+131+133+131+98+118+116+98+112+138+100+112+111+150+117+122+97+116+92+122)}{50}$

$= \frac{5891}{50}$

Mean = 117.82

ii) Median:

Arranging Data in ascending order first:

88, 92, 95, 97, 97, 97, 98, 98, 100, 100
103, 106, 109, 109, 111, 111, 112, 112, 112, 113,
113, 114, 116, 116, 117, 118, 119, 120, 120, 122,
122, 124, 124, 124, 128, 128, 128, 131, 131, 131
132, 133, 133, 135, 136, 138, 138, 142, 146, 150

$$\text{Median} = \frac{117+118}{2} = 117.5$$

Median: 117.5

iii) Mode:

This is a multimodal distribution with the modes being

modes: 97, 112, 124, 128, 131

b)

Range:

$$\text{Range} = R_m - R_l$$
$$= 150 - 88$$

Range: 62

Variance:

$$\sigma^2 = \frac{(88-117.82)^2 + (92-117.82)^2 + (95-117.82)^2 \ldots (150-117.82)^2}{50}$$

$$= \frac{4797.844 + 689.524 + 78.524 + 964.084 + 4516.401}{50}$$

$\sigma^2 = 220.8276$

Standard Deviation:

$$\sigma = \sqrt{\sigma^2}$$
$$= \sqrt{220.8276}$$

$\sigma = 14.86$

c)

$\bar{y} \pm s = 117.81 \pm 14.86 = (102.95, 132.67)$

$\bar{y} \pm 2s = 117.81 \pm 2(14.86) = (88.09, 147.53)$

$\bar{y} \pm 3s = 117.81 \pm 3(14.86) = (73.23, 162.39)$

31 values lie in range of $\bar{y} \pm s$
48 values lie in range of $\bar{y} \pm 2s$
50 values lie in range of $\bar{y} \pm 3s$
No outlier were detected.

d)

$Q_1 = \frac{(n+1)}{4} = \frac{51}{4} = 12.75 \approx 13 = 109$

$Q_2 = \frac{(n+1)}{2} = \frac{51}{2} = 25.5 = 118$

$Q_3 = \frac{3}{4}(n+1) = \frac{(51)3}{4} = 38.25 \approx 38^{th} = 131$

Min = 85
Max = 150

e) 70^{th} percentile $= \left(\frac{n+1}{100}\right) \cdot 70 = \frac{51}{100} \cdot 70 = 35.7^{th}$ value

$P_{70} = 128$

QUESTION NO.02

a) part Descriptive Statistics:

a- Mean:

$$\bar{x} = \frac{(76+63+57+\cdots\cdots+77+82+59)}{44}$$

$$= \frac{738+698+794+746}{44}$$

$$\bar{x} = 67.64$$

b)- Median.

Arranging data in ascending order

27, 40, 40, 42, 43, 43, 47, 50, 51, 55, 55, 65, 65, 69, 65, 67, 66, 68, 68, 64, 71, 72, 73, 74, 75, 75, 76, 77, 77, 77, 78, 78, 79, 80, 81, 81, 83, 86, 88, 75, 76, 95

$= \frac{71+72}{2} = \frac{143}{2} = 71.5$

Median = 71.5

c). Mode

It is a bi-modal data distribution

Modes = 68, 77

d) Range

Range = $V_{max} - V_{min}$

= 97 - 27

Range = 70

e) variance:

$$\sigma^2 = \frac{(27 - 67.64)^2 + (40 - 67.64)^2 + \cdots + (97 - 67.64)^2}{44}$$

$$= \frac{2656.22 + 2199.43 + 2706.55 + 3931.98}{44}$$

$\sigma^2 = 260.78$

f) Standard Deviation:

$\sigma = \sqrt{\sigma^2}$

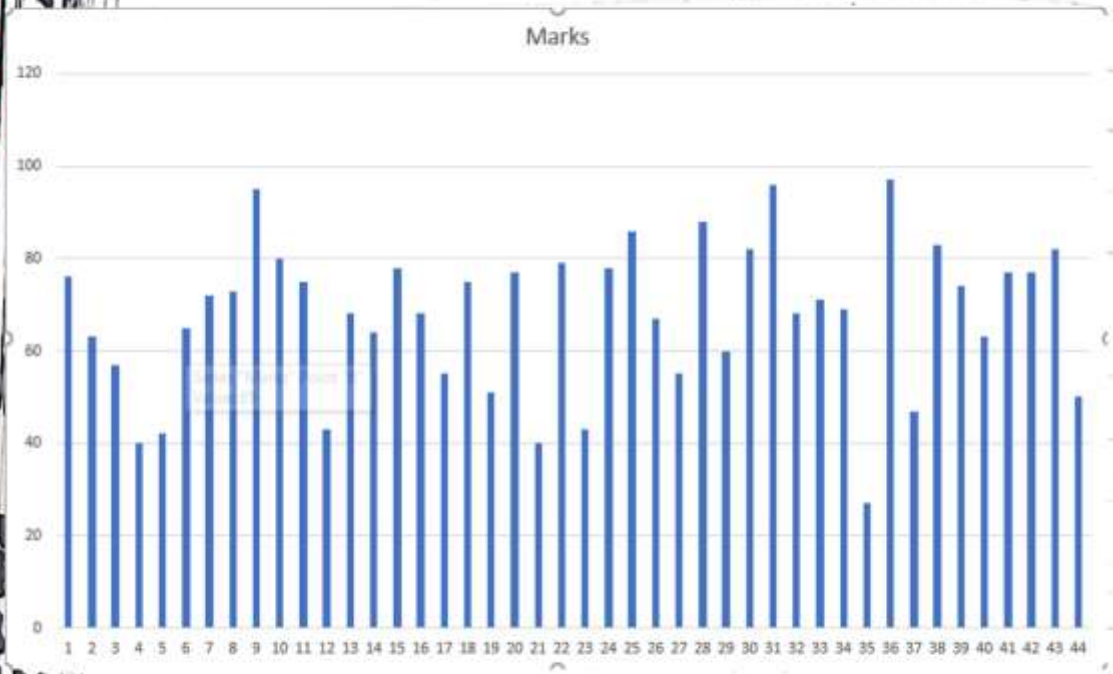
$= \sqrt{260.78}$

$\sigma = 16.14$

B)
part

c) part

Bar chart:



By looking at the bar chart we can see that majority of the students lie in the 60 - 80 range.

Piechart:

Range: 70

no. of classes: 8

class interval $= \frac{70}{8} \simeq 10$

Class 01 : $20 < x < 30$

class 02 : $30 < x < 40$

class 03 : $40 < x < 50$

class 04 : $50 < x < 60$

class 05 : $60 < x < 70$

class 06 : $70 < x < 80$

class 07 : $80 < x < 90$

class 08 : $x > 90$

class 01 = 01 value

class 02 : 0 values

class 03 = 5 values

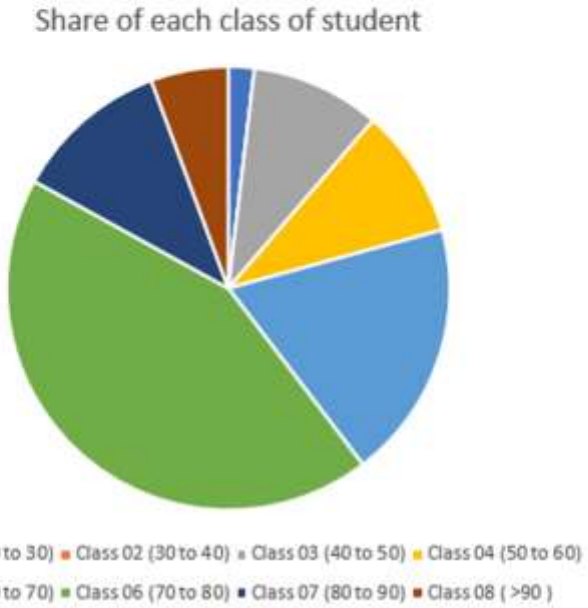
class 04 = 5 values

class 05 = 10 values

class 06 = 23 values

class 07 : 6 values

class 08 : 3 values



By taking a look at the chart we can clearly see that the majority of students secured marks in the 70 - 80 marks range, followed by the 60-70 marks range.