Assignment - 03 (Sec: 0)

Seriall no - 12

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class interval of faded signals	No of stations (f_i)	c.f	Midpoint, x_i	$f_i x_i$	$f_i \log x_i$	$\frac{f_i}{x_i}$	$\bar{x}$
1-2	1	1	1.5	1.5	0.18	0.67	
2-3	3	4	2.5	7.5	1.19	1.2	
3-4	8	12	3.5	28	4.36	2.28	3.75
4-5	6	18	4.5	27	3.92	1.33	
5-6	2	20	5.5	11	1.49	0.36	
Total	20			75	11.14	5.84	

(a) Arithmetic mean:

$$AM = \frac{1}{n}\sum_{i=0}^{n} f_i x_i = \frac{75}{20} = 3.75$$

Geometric mean:

$$GM = \text{Antilog}\left(\frac{1}{n}\sum_{i=0}^{n} f_i \log x_i\right)$$

$$= \text{Antilog}\left(\frac{11.14}{20}\right) = 3.72$$

Harmonic mean:

$$HM = \frac{n}{\sum_{i=0}^{n} \frac{f_i}{x_i}} = \frac{20}{5.84} = 3.43$$

(b)

Class	f	cf	$\lvert x_i - \bar{x} \rvert$	$f_i \lvert x_i - \bar{x} \rvert$	$f_i (x_i - \bar{x})^2$
1-2	1	1	2.25	2.25	5.06
2-3	3	4	1.25	3.75	4.68
3-4	8	12	0.25	2	0.5
4-5	6	18	0.75	4.5	3.38
5-6	2	20	1.75	3.5	6.12
Total	20			16	19.74

Median: $M_e = L + \frac{\frac{n}{2} - c}{f} \times h$

$= 3 + \frac{\frac{20}{2} - 4}{8} \times 1$

$= 3.75$

Mode: $M_o = L + \frac{f_m - f_1}{2f_m - f_1 - f_2} \times h$

$= 3 + \frac{8 - 3}{2(8) - 3 - 6} \times 1$

$= 3.71$

L = Lower limit

n = total frequency

h = class size

c = cumulative frequency of previous class.

f_m = frequency of modal class

f_1 = frequency of previous cla

f_2 = frequency of next cla

(e) As, Mean > Median > Mode. So, the distribution is positively skewed.

(g) Mean deviation, $MD = \frac{1}{n}\sum_{i=1}^{n} f_i |x_i - \bar{x}| = \frac{16}{20} = 0.8$

(e) Variance, $\sigma^2 = \frac{1}{n}\sum_{i=1}^{n} f_i (x_i - \bar{x})^2 = \frac{19.74}{20} = 0.987$

Standard deviation, $\sigma = \sqrt{\text{Variance}} = \sqrt{0.987} = 0.99$

(f) Co-efficient of variable, $CV = \frac{\sigma}{\bar{x}} = \frac{0.99}{3.75} \times 100\%$

$= 26.4\%$

Probability

3.1/ Let, A = Multiple of 3 = {3, 6, 9, 12, 15, 18}
B = Multiple of 5 = {5, 10, 15, 20}

$P(A) = \frac{6}{20}$, $P(B) = \frac{4}{20}$

$\therefore (A \cap B) = \{15\}$

$P(A \cap B) = \frac{1}{20}$

We Know,

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= \frac{6}{20} + \frac{4}{20} - \frac{1}{20}$$

$$= \frac{9}{20}$$

3.2/ Given, 15 Boys, 10 girls in a class.

Probability to find 1 Girl and 2 Boys randomly,

$$= \frac{{}^{10}C_1 \times {}^{15}C_2}{{}^{25}C_3}$$

$$= \frac{21}{46} \quad \text{(Ans.)}$$

3.3/ Given, A bag contains, 4 white, 5 red and 6 blue balls.

Probability of three drawn ball of one red of all of them, $\frac{{}^{5}C_3}{{}^{15}C_3}$

Total ball = 4+5+6 = 15

$$= \frac{10}{455} = \frac{2}{91} \quad \text{(Ans.)}$$

3.4/ Given,

5 electronic engineers
6 computer engineers } Total = 11 engineers

Among the committee of 4, the propability of,

(a) all electronic engineers $= \frac{{}^5C_4}{{}^{11}C_4} = \frac{1}{16}$ (Ans)

(b) 2 electronic engineers and 2 computer engineers,

$$= \frac{{}^5C_2 \times {}^6C_2}{{}^{11}C_4}$$

$$= \frac{5}{11} \quad \text{(Ans.)}$$