Assignment-3

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From the given dataset.

Interval	f_i	x_i	$f_i x_i$	$\bar{x}$	$f_i \log x_i$	f_i/x_i
1-2	1	1.5	1.5	$\frac{75}{20} = 3.75$	$1\log(1.5)$	$\frac{1}{1.5}$
2-3	3	2.5	7.5		$3\log(2.5)$	$\frac{3}{2.5}$
3-4	8	3.5	28		$8\log(3.5)$	$\frac{8}{3.5}$
4-5	6	4.5	27		$6\log(4.5)$	$\frac{6}{4.5}$
5-6	2	5.5	11		$2\log(5.5)$	$\frac{2}{5.5}$
Total	20		75		11.122	5.85

(a) Arithmetic mean $AM = \bar{x} = \frac{1}{n}\sum_{i=1}^{n} f_i x_i = \frac{75}{20} = 3.75$.

Geometric mean $GM = \bar{x}_G = \text{Anti}\log\left(\frac{1}{n}\sum_{i=1}^{n} f_i \log x_i\right)$

$= \text{Anti}\log\left(\frac{11.122}{20}\right) = 3.60$

Hermonic mean $HM = \bar{x}_H = \frac{n}{\sum_{i=1}^{n} \frac{f_i}{x_i}} = \frac{20}{5.85} = 3.42$

$AM > GM > HM$

6)

Interval	frequency (f)	Cumu. freq. cf
1-2	1	1
2-3	3	4
3-4	8	12
4-5	6	18
5-6	2	20

$n = 20$

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

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

$= 3 + \frac{10-4}{8}$

$= 3.75$

L = lower limit
h = size of class
f = frequency of median class
c = cumulative sum of previous class

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

$= 3 + \frac{8-3}{16-3-6} \times 1$

$= 3 + \frac{5}{7}$

$= 3.71$

f_m = modal class frequency
f_1 = modal class Previous frequency
f_2 = modal class next frequency.

c) Skewness = mean − median
= 3.75 − 3.75
= 0.00

Skewness = 0 the distribution would be ~~Positively~~ ~~skewed~~. Symmetrical.

d)

Interval	f_i	x_i	$f_i x_i$	$\bar{x}$	$x_i - \bar{x}$	$f_i\|x_i - \bar{x}\|$	$f_i(x_i - \bar{x})$
1-2	1	1.5	1.5		-2.25	2.25	5.06
2-3	3	2.5	7.5		-1.25	3.75	4.69
3-4	8	3.5	28	$\frac{75}{20}$	-0.25	2	0.5
4-5	6	4.5	27	$= 3.75$	0.75	4.5	3.375
5-6	2	5.5	11		1.75	3.5	6.125
Total	= 20		= 75			= 16	= 19.75

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

→

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

$= \frac{19.75}{20} = 0.9875$

Standard deviation $\sigma = \sqrt{\text{variance}} = \sqrt{\sigma^2}$

$= \sqrt{0.9875} = 0.994$

f) Coefficient of variation $CV = \frac{\sigma}{\bar{x}} \times 100\%$

$= \frac{0.994}{3.75} \times 100\%$

$= 26.51\%$

3.1 Let, A is multiple of 3 = {3, 6, 9, 12, 15, 18} with the number 1 to 20, $P(A) = \frac{6}{20}$

B is multiple of 5 = {5, 10, 15, 20} = $\frac{4}{20}$

$A \cap B = \{15\} = \frac{1}{20}$

The Probability of the drawn ticket number is multiple of 3 or 5 would be

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

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

$$= \frac{9}{20} = 0.45 \simeq 45\%$$

3.2 15 boys and 10 girls. Total 25 students.

Let, A = 1 girl and 2 boys $P(A) = \frac{{}^{15}C_2 \times {}^{10}C_1}{{}^{25}C_3}$

$$= \frac{21}{46} = 0.457$$

$$= 45.7\%$$

3.3 4 white, 5 red and 6 blue ball Total 15 balls in the beg.

Let A = all 3 ball is red $P(A) = \frac{{}^5C_3}{{}^{15}C_3}$

$= \frac{2}{91}$

3.4 5 electrical engineer and 6 computer engineers totall 11 engineers.

a) Let, A = all 4 are electrical engineers

$P(A) = \frac{{}^5C_4}{{}^{11}C_4} = \frac{1}{66}$

b) Let, B = 2 electric and 2 computer engineers

$P(B) = \frac{{}^5C_2 \times {}^6C_2}{{}^{11}C_4} = \frac{5}{11}$