1st July, 2023 ISM ASSIGNMENT - 1 KASHIF SAIYED

SECTION - 3

Q1. Total school students initially (n_{old}) = 100

$\bar{x}_{old} = 15$, $\sigma_{old} = 3$

New students (n_{new}) = 150, Total students (n_{total}) = 250

$\bar{x}_{total} = 15.6$, $\sigma_{total} = 3.66$; $\bar{x}_{new}$, σ_{new} = ?

$\bar{x} = \Sigma x_i / N$, $\sigma = \sqrt{\frac{\Sigma (x_i - \bar{x})^2}{N}}$

$$\bar{x}_{new} = \frac{\left(\sum_{n_{total}} x_{total} - \sum_{n_{old}} x_{old}\right)}{(n_{total} - n_{old})}$$

$$= \frac{[(15.6 \times 250) - (15 \times 100)]}{(250 - 100)} \Rightarrow \frac{[3900 - 1500]}{(250 - 100)}$$

$$\Rightarrow \underline{16}$$

$$\sigma_{new} = \sqrt{\frac{(\sigma_{total})^2 \times 250 - (\sigma_{old})^2 \times 100}{(250 - 100)}}$$

$$= \sqrt{\frac{3349 - 900}{150}} = \underline{4.04}$$

Q2. 3 coins are tossed simultaneously.

Outcome	3H	2H	1H	NoHead	Total
Freq.	38	100	64	48	250

1. $P(1H) = \frac{64}{250} = \underline{0.256}$
2. $P(2H \& 1T) = P(2H) = \frac{100}{250} = \underline{0.4}$
3. $P(3T) = P(\text{No Head}) = \frac{48}{250} = \underline{0.192}$

Q3. 32 Bulbs, $P(\text{Defective}) = 0.25$, $P(\text{Not defective}) = \underline{0.75}$

Number of Defective $= 0.25 \times 32 = \underline{8}$

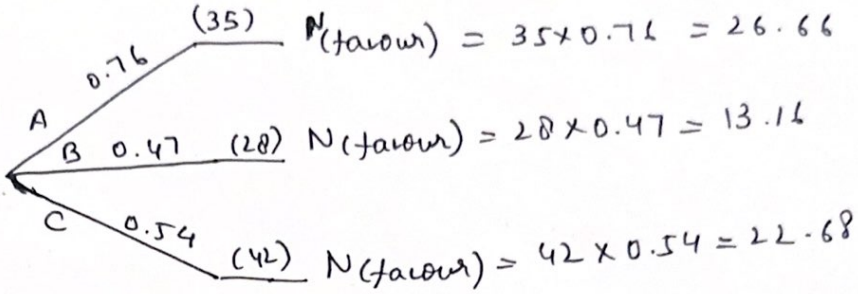
Number of Not defective $= \underline{24}$

$P(\text{Not Defective} \mid \text{First Bulb is defective}) = \frac{23}{31} = \boxed{0.74}$

Since first bulb is removed without replacement, & the first bulb is found to be non-defective, Hence $24 - 1 = \underline{23}$

04 Disjoint Age groups: A, B, C

$P(A_{favour}) = 0.76$; $P(B_{favour}) = 0.47$; $P(C_{favour}) = 0.54$



$N(favour) = 35 \times 0.76 = 26.66$

$N(favour) = 28 \times 0.47 = 13.16$

$N(favour) = 42 \times 0.54 = 22.68$

$$P(\text{Group B} \mid \text{product is favoured}) = \frac{P(\text{product is favoured} \mid B) \times P(B)}{P(\text{product is favoured})}$$

$$= \frac{0.47 \times 0.27}{0.595}$$

$$= \underline{0.213}$$

$P(B) = \frac{28}{105} = 0.27$

$P(\text{product is favoured}) = \frac{(26.66 + 13.16 + 22.68)}{105}$

$= \underline{0.595}$