25 August 2023

Ans 1:

4 children (B & G)

3B + 1G | 2B + 2G | 1B + 3G | 0B + 4G

$^4C_4$

Total way of selecting 4 children from 10

$= {}^{10}C_4 = \frac{10!}{6!\,4!} = 210$ ways

In a team 4 children

All girls team $= {}^4C_4 = 1$

Atleast boy $\Rightarrow {}^{10}C_4 - {}^4C_4$

$= 210 - 1$

$=$ 209 ways to select 4 children from team of 6B and 4G such that there will be atleast 1 B in each selection.

(ans)

(2) (61)

12, 20, 13, 100, 100, 100, 100

Sec 1 : 12/100 — $^{100}C_{12}$

2 : 20/100 — $^{100}C_{20}$

3 : 13/100 — $^{100}C_{13}$

4 : 17/100 — $^{100}C_{17}$

$^{400}C_1 = 400$

?

Total weak student

(3). Box : B1 → 4W, 2B

B2 → 1W, 3B

↳ draw B

Initially:

A : be the event

... BOX ⟶ 3W , 2B ... W

After Transfering: ~~Box1~~ Box1 → 3 W , 2 B

Using Bayes theorem Box2 → 2 W , 3 B → draw

} Ⓐ be the event of transfering white ball.

Ⓑ event of drawing Black ball from B2.

$$P(A/B) = \frac{P(B/A) \cdot P(A)}{P(B)}$$

$P(B/A)$ = Probability of drawing Black ball from Box2 when white ball is transfered in Box2 $= 3/5$

$P(B)$ = Probability of drawing black ball from box2.

↳ in two ways (i) if white ball transferred $= 4/6$

(ii) if black ball transfered $= 2/6$

$$P(B) = \frac{3}{5} \times \frac{\cancel{4}^{2}}{\cancel{6}_{3}} + \frac{3}{5} \times \frac{\cancel{2}}{\cancel{6}} = \frac{2}{5} + \frac{1}{5} = \frac{3}{5}$$

$$\therefore P(A/B) = \frac{P(B/A) \cdot P(A)}{P(B)} = \frac{\cancel{\frac{3}{5}} \times \frac{4}{6}}{\cancel{\frac{3}{5}}} = \frac{4}{6} = \frac{2}{3}$$

(ans)

Pmf :→ x is a r.v ⇒ discrete.

↳ 1. Binomial Distribu. } ✓

2. Poisson Distribu. } ✓

Bernolli → $x = 0, 1$

No. of trials ↑ ⇒ $x = 0, 1, \dots, n$

r.v discrete

↳ 1. Binom...
2. Poisson Distribn.]

r.v discrete

pmf.

1. What is a Binomial Distribution:

A discrete r.v X with parameter 'p' and 'n' follows a pmf

$$f(x) = {}^nC_x\, p^x q^{n-x} \quad \text{for } x = 0, 1, 2, \ldots, n$$
$$= 0 \quad \text{elsewhere}$$

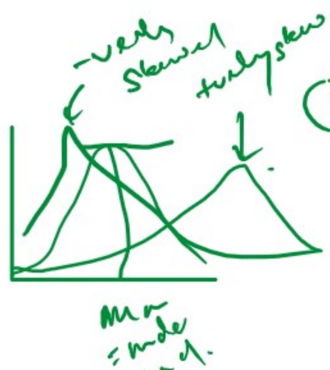
where n = no. of trials
p = probab of success and q = prob of failure $= 1-p$.

is Binomial Distribution.

Properties: (i) mean, $E(x) = np = \mu$ (population mean of B.D.)

(ii) variance, $V(x) = npq = \mu_2$
$= np(1-p)$ (pop. variance)

$S.D = \sqrt{V(x)} = \sqrt{npq}$



(iii) Bimodal: when $(n+1)p$ is integer
⇒ two modes are $(n+1)p$ and $(n+1)p - 1$

Unimodal ⇒ when $(n+1)p$ is fractional
⇒ greatest integer in $(n+1)p$.

$\gamma_1 = 0$
$\gamma_1 > 0$
$\gamma_1 < 0$

(iv) $\mu_3 = npq(q-p)$; $\mu_4 = 3n^2p^2q^2 + npq(1-6pq)$

μ_r' ⇒ raw moment
$\mu_r' = \frac{1}{n}\Sigma(x_i - A)^r$

μ_r ⇒ central moment
$\mu_r = \frac{1}{n}\Sigma(x_i - \bar{x})^r$

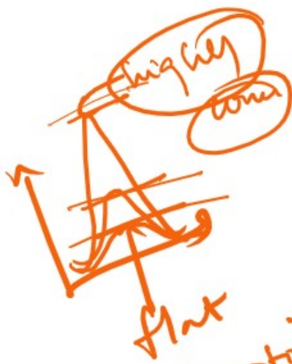
(v) $\beta_1 = \frac{\mu_3^2}{\mu_2^3} = \frac{(q-p)^2}{npq}$

Skewness, $\gamma_1 = \sqrt{\beta_1} = \frac{q-p}{\sqrt{npq}} \gtreqless 0$

Binomial Distribn is +ve skew, symmetrical
-ve skew

Bino$_{mial}$ Distribn is +ve skew, symmetrical or −ve skew according to $p \lessgtr q$

$$\boxed{p \lessgtr 1/2}$$



(vi) Measure of peakedness is Kurtosis $= \gamma_2 = \beta_2 - 3$

or, $\gamma_2 = \dfrac{1 - 6pq}{npq} \gtrless 0$

$\gamma_2 > 0$ (Lepto)

$\gamma_2 = 0$ (meso)

$\gamma_2 < 0$ (platy)

B-D is leptokurtic, mesokurtic or platykurtic according to

$\gamma_2 \gtrless 0$

or, $pq \gtrless 1/6$