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2K19CSUN01139

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~~Pas~~ PAS

Tut-2

Q-1 4W, 3R

μ = Mean = $\Sigma p_i x_i$ = $E(x)$

σ^2 = Variance = $\Sigma p_i x_i^2 - \mu^2$

σ = S.D. = $\sqrt{\Sigma p_i x_i^2 - \mu^2}$ = $\sqrt{\text{Variance}}$

X = No. of Red Ball drawn :-

X = 0, 1, 2, 3 [∵ 3 Balls are drawn]

$$P(x=0) = \frac{{}^4C_3}{{}^7C_3} = \frac{4}{35}$$

$$P(x=1) = \frac{{}^4C_2 \times {}^3C_1}{{}^7C_3} = \frac{18}{35}$$

$$P(x=2) = \frac{{}^4C_1 \times {}^3C_2}{{}^7C_3} = \frac{12}{35}$$

$$P(x=3) = \frac{{}^4C_0 \times {}^3C_3}{{}^7C_3} = \frac{1}{35}$$

$$\text{Mean} = \frac{0\times4}{35} + \frac{1\times18}{35} + \frac{2\times12}{35} + \frac{3\times1}{35}$$

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$$\begin{array}{r} 18 \\ 48 \\ \hline 66 \\ +9 \\ \hline 75 \end{array}$$

$$= 0 + \frac{18}{35} + \frac{24}{35} + \frac{3}{35} = \frac{45}{35} = \frac{9}{7}.$$

Variance

$$\Sigma p_i x_i^2 - \mu^2$$

$$x^2 = 0, 1, 4, 9$$

$$= \left(0 \times \frac{4}{35} + 1 \times \frac{18}{35} + 4 \times \frac{12}{35} + 9 \times \frac{1}{35}\right) - \frac{81}{49}$$

$$= \left(0 + \frac{75}{35}\right) - \frac{81}{49}$$

$$\frac{75 \times 49 - 81 \times 35}{35 \times 49} = \frac{3675 - 2835}{1715}$$

$$= \frac{24}{49}.$$

S.D.

$$\sqrt{\frac{24}{49}}$$

$$= \frac{2\sqrt{6}}{7}$$

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PAS

Tut-2

2.

$F(x) = 0 \quad , \quad -\infty < x < 0$

$F(x) = 1/8 \quad , \quad 0 \leq x \leq 1$

$F(x) = 1/2 \quad , \quad 1 \leq x \leq 2$

$F(x) = 7/8 \quad , \quad 2 \leq x \leq 3$

$F(x) = 1 \quad , \quad 3 \leq x \leq \infty$

3. (i) $E(x) = -\frac{1}{3} + \frac{1}{6} + \frac{2}{3}$

$= \frac{1}{6} + \frac{1}{3} = \frac{3}{6}$

$= \frac{1}{2}$

ii) $E(x+2) = E(x) + 2$

$= \frac{1}{2} + 2 \Rightarrow \frac{5}{2}$

iii) $E(4x) = 4\,E(x)$

$= 4 \times \frac{1}{2} \Rightarrow 2$

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iv) $Var(x) = E(x^2) - (E(x))^2$

$= \frac{3}{2} - \left(\frac{1}{2}\right)^2$

$= \frac{5}{4}$

$Var(x+4) = \frac{5}{4}$

24. (i) $a + 3a + 5a + 7a + 9a + 11a + 13a + 15a + 17a = 1$

$a = \frac{1}{81}$

ii) $P(x < 3) = \frac{9}{81} = \frac{1}{9}$

$P(x \geq 3) = \frac{72}{81} = \frac{8}{9}$

$P(2 \leq x < 5) = \frac{21}{81} = \frac{7}{27}$

$\mu = \frac{8}{8} + \frac{12}{6} + \frac{16 \times 8}{8} + \frac{20}{4} + \frac{24}{12}$

$= 1 + 2 + 6 + 5 + 2$

$\boxed{\mu = 16}$

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$$\Sigma x^2 p(x) = \frac{8\times 8}{8} + \frac{12\times 12}{6} + \frac{16\times 16\times 3}{8} + \frac{20\times 20}{4} + \frac{24\times 24}{12}$$

$$= 8 + 24 + 96 + 100 + 48$$

$$= 276$$

$$\sigma = \sqrt{276 - 16} = \sqrt{260}$$

5. $P(\text{good eggs}) = \frac{10}{12} = 5/6$

$P(\text{Bad eggs}) = \frac{2}{12} = 1/6$

Let x be the Random Variable,

$$P(x=0) = \frac{{}^{2}C_0 \cdot {}^{10}C_3}{{}^{12}C_3}$$

$$= \frac{120}{220} = \frac{12}{22}$$

$$P(x=1) = \frac{{}^{2}C_1 \cdot {}^{10}C_2}{{}^{12}C_3}$$

$$= \frac{90}{220} = \frac{9}{22}$$

$$P(x=2) = \frac{{}^{2}C_2 \cdot {}^{10}C_2}{{}^{12}C_3} = \frac{1\cancel{0}}{22\cancel{0}} = \frac{1}{22}$$

Probability distribution :-

x	0	1	2
$P(x)$	12/22	9/22	1/22