(2) If the sum of the mean and var of binomial distibution for 5 trails is 1.8. Find the probability distribn function.

Mean $\mu = np$

Variance $\sigma = npq$

5 trials ⇒ $n=5$

$np+npq = 1.8$

$np(1+q) = 1.8$

$np(1+1-p) = 1.8$

$= np(2-p) = 1.8$

$\Rightarrow 5p(2-p) = 1.8$

$\Rightarrow -5p^2+10p-1.8=0$

$\Rightarrow 5p^2-10p+1.8=0$

$\Rightarrow p = \frac{9}{5}, \frac{1}{5} \qquad p \neq \frac{9}{5}$

$\therefore p = \frac{1}{5} = 0.2$

$q = 0.8$

$p=0.2 \quad q=0.8$

$$f(x) = \begin{cases} 0.2 & \text{if success} \\ 0.8 & \text{otherwise} \end{cases}$$

$$PDF = \begin{cases} 5C_x\left(\frac{1}{5}\right)^x\left(\frac{4}{5}\right)^{5-x} & x=0\ldots5 \\ 0 & \text{otherwise} \end{cases}$$

(3) It is known that 2% of the account in company are deliquet. If 5 accounts selected at random. Compute probabalities

(1) atmost 2 accounts will be deliq.

(2) Atmost 4 will be "

$p = 2\% = 0.02 \quad q = 1-p = 0.98$

$n = 5$

(1) Let x denote the deliquent accont then $x \sim B(x, n, p)$ $\quad P(x=x) = {}^nC_x p^x q^{n-x}$

(1) $P[x \leq 2] = P[x=0] + P[x=1] + P[x=2]$

$= 5C_0\, 0.02^0\, 0.98^5$

$+ 5C_1 \times 0.02^1 \times 0.98^4$

$+ 5C_2 \times 0.02^2\, 0.98^3$

$= \underline{0.9999}$

(2) Atmost 4

$P[x \leq 4] = 1 - P[x > 4]$

$= 1 - P[x=5]$

$= 1 - 5C_5\, 0.02^5\, 0.98^0$

$= \underline{0.999}$

4. A random var 'x' takes the val −3, −2, −1, 0, 1, 2, 3 such that

$P(X=0) = P(X>0) = P(X<0)$

and

$P(X=-3) = P(X=-2) = P(X=-1)$

$= P(X=1) = P(X=2) = P(X=3)$

obtain probability dist of fun of X

~~dist to be prob of~~

$$f(x) = \begin{cases} k, & x = -3, -2, -1, 1, 2, 3 \\ 3k, & x = 0 \end{cases}$$

$$\therefore \sum_{x=-\infty}^{\infty} f(x) = 1 \Rightarrow \cancel{4k}$$

$$\cancel{k = \frac{1}{4}}$$

$$\Rightarrow 6k + 3k = 1$$

$$\Rightarrow 9k = 1 \Rightarrow k = \frac{1}{9}$$

x =	−3	−2	−1	0	1	2	3
f(x)	1/9	1/9	1/9	1/3	1/9	1/9	1/9

$$\therefore f(x) = \begin{cases} \frac{1}{9}, & x < 1, 2, 3, -1, -2, -3 \\ \frac{1}{3}, & x = 0 \\ 0, & \text{otherwise} \end{cases}$$

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Thursday 1

A coin is biased so that head twice as likely to appear as the tail. The coin is tossed twice. find expectance also variance of head.

Let X be the number of head.

$$\therefore f(x) = \begin{cases} 2k & x = 0, 2 \\ k & x = 0, 1 \end{cases}$$

$$\sum_{-\infty}^{\infty} f(x) = 1 \Rightarrow 3k = 1 \Rightarrow k = \frac{1}{3}$$

$$p = P(\text{Head}) = \frac{2}{3} \quad q = \frac{1}{3}$$

n = No of ~~____~~ trials $= 2$

$\therefore$ Expectance of binomial distro

$$\text{is} = np$$

$$= 2 \times \frac{2}{3} = \frac{4}{3}$$

$$\left.\begin{array}{l}\text{Variance of binomial} \\ \text{distribution}\end{array}\right\} = npq$$

$$= 2 \cdot \frac{2}{3} \cdot \frac{1}{3}$$

$$= \frac{4}{9}$$

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1. A dice is tossed thrice. A success is getting 1 or 6. Find mean & variance of the success.

$n = 3$

$P(\text{Getting 1 or 6}) = \frac{1}{6} + \frac{1}{6} = \frac{2}{6} = p$

$q = \frac{4}{6}$

Mean $= np = \cancel{3} \times \frac{2}{\cancel{6}_2} = \underline{1}$

Variance $= npq = \cancel{3} \times \frac{\cancel{2}}{\cancel{6}\cancel{2}} \times \frac{4}{6} = \frac{4}{6} = \frac{2}{3}$

2. A random var X has the following prob func

Value of X

X:	0	1	2	3	4	5	6	7
$f(x)$, $p(X)$:	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7k^2+k$

We know that $\sum_{x=-\infty}^{\infty} f(x) = 1$

$\therefore k + 2k + 2k + 3k + k^2 + 2k^2 + 7k^2 + k = 1$

$\Rightarrow 10k^2 + 9k - 1 = 0$

$\Rightarrow k = \frac{1}{10}$ or -1

$k \neq -1$ since $P(X=1) \nless 0$

$\therefore k = \frac{1}{10}$

$P(X \geq 6) = 2k^2 + 7k^2 + k = 9k^2 + k$

$= 9 \times \frac{1}{100} + \frac{1}{10} = \frac{9+10}{100} = \frac{19}{100}$

$P(X<6) = 0 + k + 2k + 2k + 3k + k^2$

$= 8k + k^2$

$= \frac{8}{10} + \frac{1}{100} = \frac{81}{100}$

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$$P(3 < X \leq 6) = 3k + k^2 + 2k^2$$
$$= 3k + 3k^2$$
$$= \frac{3}{10} + \frac{3}{100}$$
$$= \frac{33}{100}$$

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