MS0201A : Problem Set 4

Answers

(1) 6

(2) $\dfrac{1-2p+2p^2}{p(1-p)}$

(3) (a) $E(X)$ does not exist

(b) $E(X)$ does not exist

(c) $E(X)$ does not exist

(4) (a) $E(X) = \dfrac{a}{a+1}$; $V(X) = \dfrac{a}{a+2} - \left(\dfrac{a}{a+1}\right)^2$

sly others

(5) $E(X) = a\sqrt{\frac{1}{c}+1} + \mu$

$V(X) = \left(a^2\sqrt{\frac{2}{c}+1} + 2a\mu\sqrt{\frac{1}{c}+1} + \mu^2\right) - \left(a\sqrt{\frac{1}{c}+1} + \mu\right)^2$

(6) $(0.5)^{1/3}$

(7) $\int_0^\infty (1-F(x))\,dx = \int_0^\infty \int_x^\infty f(y)\,dy\,dx \cdots = E(X)$

(8) $E(Z) = 0\times\frac{1}{3} + 2\times\frac{1}{6} + 3\times\frac{1}{6} + 4\times\frac{1}{3}$

Z ↗ score

(9) (a) $M_X(t) = (q+pe^t)^n$; $E(X) = np$, $V(X) = npq$

sly (b)

(c) $M_X(t) = (1-\beta t)^{-\alpha}$ $\quad t < \frac{1}{\beta}$

$E(X) = \alpha\beta$; $V(X) = \alpha\beta^2$

(10)

p.m.f

$X = x$	-5	4	5	25
$P(X=x)$	$1/2$	$1/6$	$1/8$	$5/24$

→ d.f (step f^n)

(11) Markov's inequality

(12) Chebysher's inequality

(13) By Chebysher's ineq

$$P(|X| \geq \epsilon) \leq \frac{1}{4\epsilon^2}$$

Also $P(|X| \geq \epsilon) = \begin{cases} 1/4 & 0 < \epsilon \leq 1 \\ 0, & \epsilon > 1 \end{cases}$

For $\epsilon = 1$, bound is attained.

(14) Condition is $p > \frac{1}{2}$

(15) reqd prob $= \binom{4}{4}\left(\frac{2}{3}\right)^5 + \binom{5}{4}\left(\frac{2}{3}\right)^5\left(\frac{1}{3}\right)^1 + \text{- - - . + - - - .}$

(16) reqd prob $= \binom{2N-K}{N}\left(\frac{1}{2}\right)^{2N-K}$

$K = 0, 1, \text{- . } N$