$\rightarrow \boxed{C = \frac{\ }{a^2}}$ $f_X(x) = \begin{cases} \ \\ 0 \end{cases}$

(b) $E[X] = \int_{-\infty}^{\infty} x f_X(x)\,dx = \int_0^a x \cdot \frac{2}{a^2} x\,dx$

$= \frac{2}{a^2} \left. \frac{x^3}{3} \right|_0^a = \frac{2}{a^2} \frac{a^3}{3} = \boxed{\frac{2}{3}a}$

(c) $E[X^2] = \int_{-a}^{\infty} x^2 f_X(x)\,dx = \int_0^a x^2 \cdot \frac{2}{a^2} x\,dx = \frac{2}{a^2}$

$= \frac{2}{a^2} \frac{a^4}{4} = \frac{2a^2}{4} = \boxed{\frac{a^2}{2}}$ $\frac{a}{18}$

(d) $Var(X) = E[X^2] - (E[X])^2 = \frac{a^2}{2} - (\frac{2}{3}a)^2 = a^2 (\frac{1}{\ }$

b) $E[X^2] = \sum_{x \in \mathcal{X}} x^2 P_X(x) = \sum_{x=0}^{1} x^2 P_X(x) =$

$=$

c) $Var(X) = E[X^2] - (E[X])^2 = p - p^2 = \boxed{p}$

$$= \begin{cases} \lambda e^{-\lambda y^2} |2y| , & y \geq 0 \\ 0 , & \text{o.w} \end{cases}$$

$$= \boxed{\begin{cases} 2\lambda y e^{-\lambda y^2} , & y \geq 0 \\ 0 , & \text{o.w.} \end{cases}}$$

(b)

$E[Y^2] = \overset{\text{easy way}}{} \; E[X] = \frac{1}{\lambda}$ (from E

Derivation: $\quad t = \lambda x \quad x = \frac{t}{\lambda}$

$= \int^{\infty} x \lambda e^{-\lambda x} dx =$

(b) $E[(Y-E[Y])^{\cdot}] = ?$

$$E[Y] = \underset{(\text{from } a)}{a}\, E[X] = 0.$$

$$\Rightarrow E[(Y-E[Y])^n] = E[(Y-0)^n] = E[Y^{\cdot}$$

Note since; $E(Y)=0$, the answer to (a) a...
the same (moment = centerlized moment
if $E[Y]=0$)

$$f_Y(y) = \begin{cases} f_X(g_1^{-1}(y))\left|\frac{dg_1^{-1}(y)}{dy}\right| + f_X(g_2^{-1}(y))\left|\frac{dg_2^{-1}(y)}{dy}\right| & y \geq 0 \\ 0 & y < 0 \end{cases}$$

$$f_X(x) = \begin{cases} \frac{1}{2}, & -1 \leq x \leq 1 \\ 0, & \text{o.w.} \end{cases}$$

$y \geq 0$

$$g_1^{-1}(y) = -\sqrt{y} \rightarrow \frac{dg_1^{-1}(y)}{dy} = -\frac{1}{2}\frac{1}{\sqrt{y}} \rightarrow \left|\frac{dg_1^{-1}(y)}{dy}\right| =$$

$$g_2^{-1}(y) = \sqrt{y} \rightarrow \frac{dg_2^{-1}(y)}{dy} = +\frac{1}{2\sqrt{y}} \rightarrow \left|\frac{dg_2^{-1}(y)}{dy}\right| =$$

$$\Rightarrow f_Y(y) = \begin{cases} \frac{1}{2}\cdot\frac{1}{2\sqrt{y}} + \frac{1}{2}\frac{1}{2\sqrt{y}} = \frac{1}{2}\frac{1}{\sqrt{y}} & \cancel{-1} \leq \sqrt{y} \leq 1 \rightarrow \\ 0, & \text{o.w} \end{cases}$$

$$= \int_{-1}^{1} x^2 \frac{1}{2}\,dx = \frac{x^3}{2\cdot 3}\Big|_{-1}^{1} = \frac{x^3}{6}\Big|_{-1}^{1} =$$

$x \in \mathcal{X}$

$= \frac{e^{s}+e^{-s}}{2}.$

(b) $E[X^n] = \sum_{x} x^n P_X(x) = 1^n \cdot \frac{1}{2} + ($

$= \frac{1}{2}(1+(-1)^n$

$= \begin{cases} 1 \\ 0 \end{cases}$

(c) PMF of X^2

Let $Y = X^2$ PMF of Y is $P_Y(y) = \{$

since $x = \pm 1 \rightarrow y = x^2 = 1$