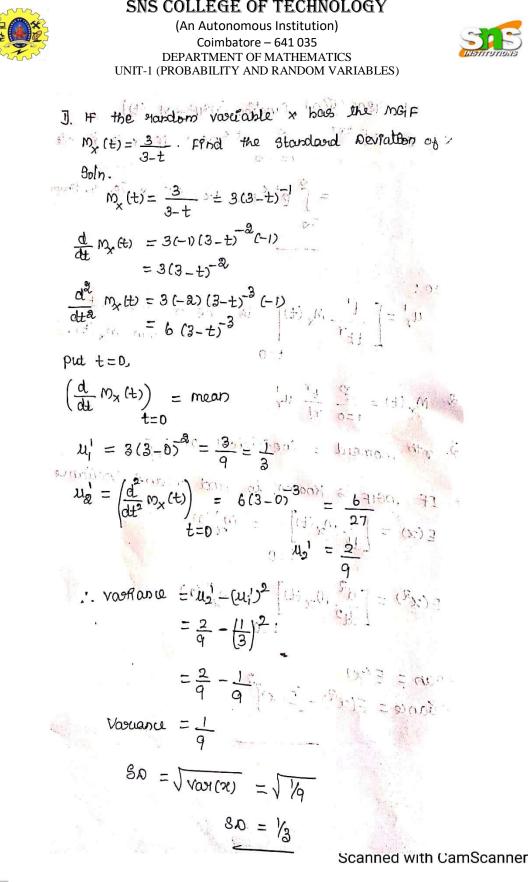


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Nonvert Generating Function (MGIF - M. (+)) $M_{x}(t) = E\left[e^{tx}\right] = \stackrel{\infty}{=} e^{tx} P(x) \quad \text{if } x \quad \text{is differential}$ = ptx f(x) dx if x is continuous in the market of the second Note: 1. $u_{\gamma}' = \left[\frac{d^{\gamma}}{dt^{\gamma}} M_{\chi}(t) \right]$ is the γ^{th} moment from $M_{\chi}(t)$. $a. M_{x}(t) = \sum_{r=0}^{\infty} \frac{t^{T}}{r!} \mu_{r}^{t}$ 3. gth moment = coefficient of $\frac{t'}{\gamma!}$ 4. If MG1F, is known, to find mean & Variance $E(x) = \begin{bmatrix} d & M_{21}(t) \end{bmatrix} = M'(0).$ $E(x^{2}) = \left[\frac{d^{2}}{dt^{2}} M_{\chi}(t)\right]^{2} = M_{\chi}^{2}(0)$ t=0mean = E(x)variance = $E(x^{2}) - [E(x)]^{2}$ Scanned with CamScanner





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Soln.

$$M_{x}(t) = \int_{0}^{\infty} e^{tx} F(x) dx$$

$$= \int_{0}^{2} e^{tx} \frac{1}{3} dx$$

$$= \frac{1}{3} \int_{-1}^{2} e^{tx} dx$$

$$= \frac{1}{3} \left(\frac{e^{tx}}{t} \right)_{-1}^{2}$$

$$M_{x}(t) = \frac{1}{3t} \left[e^{2t} - e^{t} \right]$$
If Find moment generating function of the landom variable $x = 1, 2, \dots$ whale piotability mass function $P[x = x] = \frac{1}{2x}, x = 1, 2, \dots$
Find its mean and variance.
Soln.

$$M_{x}(t) = \int_{x=1}^{\infty} \frac{e^{tx}}{e^{tx}} P(x)$$

$$= \frac{2}{x=1} e^{tx} \frac{1}{2x}$$

$$= \frac{2}{x=1} \left(\frac{e^{t}}{2} \right)^{2} \left(\frac{e^{t}}{2} \right)^{3} + \dots$$

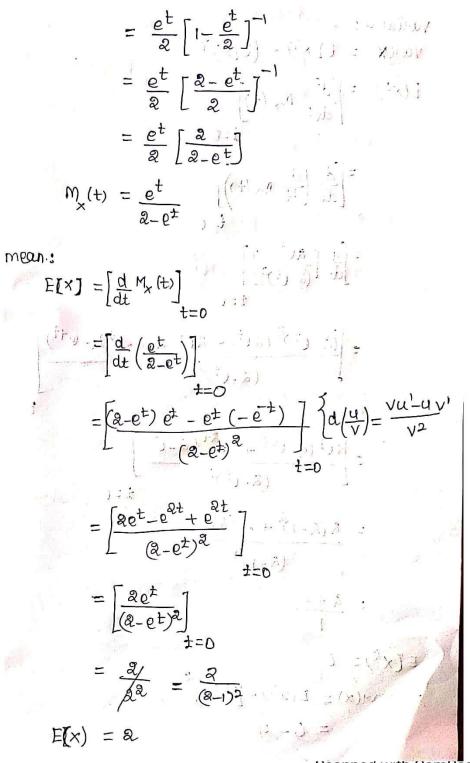
$$= \frac{e^{t}}{2} \left[1 + \frac{e^{t}}{2} + \left(\frac{e^{t}}{2} \right)^{2} + \dots \right]$$

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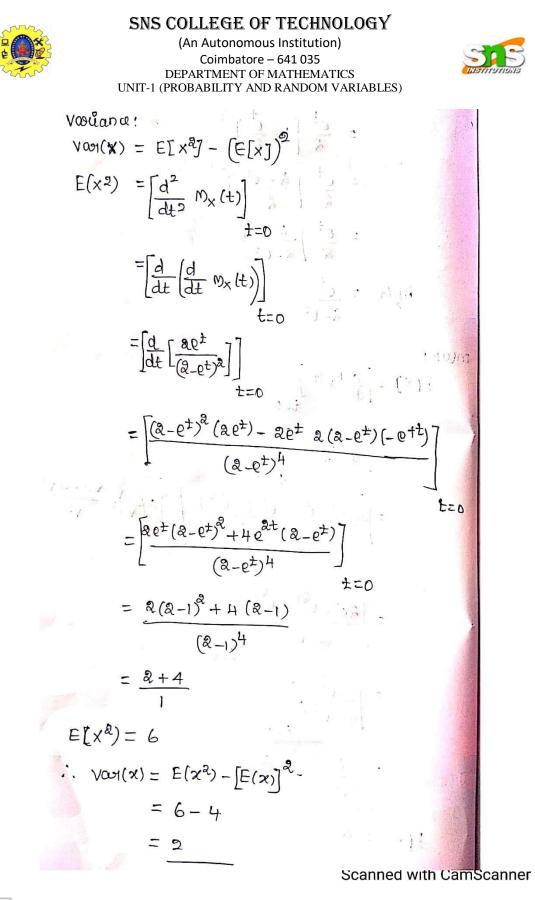


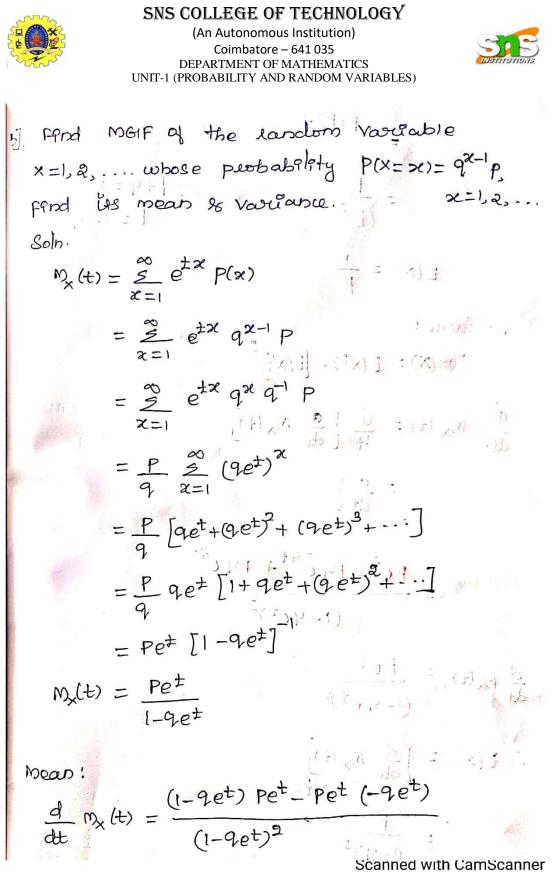
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$$= \frac{Pe^{t} - Pqe^{at} + Pqe^{at}}{(t - qe^{t})^{2}}$$

$$\frac{d}{dt} m_{x}(t) = \frac{Pe^{t}}{(t - qe^{t})^{2}}$$

$$\therefore E(x) = \left[\frac{d}{ott} m_{x}(t)\right]$$

$$= \frac{P}{(t - q)^{2}}$$

$$= \frac{P}{(t - q)^{2}}$$

$$= \frac{P}{P^{2}}$$

$$P + q = 1$$

$$P = 1 - q$$

$$E(x) = \frac{1}{P}$$

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$$\begin{aligned} vau(anu: : \\ vau(x) &= E(x^{2}) - \left[E(x)\right]^{2} \\ \frac{d^{2}}{dt^{2}} m_{x}(t) &= \frac{(1 - qe^{t})^{2} Pe^{t} - Pe^{t} 2(1 - qe^{t})(-qe^{t})}{(1 - qe^{t})^{4}} \\ E(x^{2}) &= \left[\frac{d^{2}}{dt^{2}} m_{x}(t)\right] \\ &= 0 \\ &= \frac{(1 - q)^{2}P - Px 2(1 - q)(-q)}{(1 - q)^{4}} \\ &= \frac{P^{2}P + 2p^{2}q}{P^{4}} & :: P+q=1 \\ &= \frac{P^{3} + 2P^{2}q}{P^{4}} \\ &= \frac{p^{2}(P + 2q)}{p^{4}} \\ E(x^{2}) &= \frac{P + 2q}{p^{2}} \\ &= \frac{P + 2q}{p^{2}} \\ &: Vool(X) = \frac{P + 2q}{p^{2}} - \left(\frac{1}{P}\right)^{2} \\ &= \frac{P + 2q - 1}{p^{2}} \\ &= \frac{P + 2q - 1}{p^{2}} \\ &= \frac{P + 2q - 1}{p^{2}} \\ \end{aligned}$$

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