

1. Let X have the following PF:

$$f(x) = \begin{cases} 0.1 & X = 0 \\ 0.3 & X = 1 \\ 0.6 & X = 2 \\ 0 & \text{otherwise.} \end{cases}$$

(a) Find $M_x(t)$.

(b) Using $M_x(t)$, find $E(X)$.

(c) Let $Y = 2X + 3$. Use $M_x(t)$ to find $M_y(t)$.

2. Let X follow an exponential distribution with a mean of 1:

$$f(x) = \begin{cases} e^{-x} & x > 0 \\ 0 & \text{otherwise.} \end{cases}$$

(a) Find $M_x(t)$.

(b) Let $Y = \frac{X}{\lambda}$, so that Y follows an exponential with a mean of $\frac{1}{\lambda}$. Use $M_x(t)$ to find $M_y(t)$.

(c) Use $M_y(t)$ to find the mean and variance of the exponential.