Question
Suppose that a random variable X has the pdf

$$f(x) = e^{-(x-\mu)},\ x > \mu.$$

Obtain the mean and variance of X.

Answer
Let $Y = X - \mu$.
Then the transformation is one-to-one and increasing. Using the transformation technique, the pdf of Y is

$$g(y) = e^{-y},\quad y > 0$$

Hence $Y \sim$ exponential$(\beta = 1)$
Therefore $E(Y) = 1 = \text{var}(Y)$
Therefore $E(X) = E(Y + \mu) = 1 + \mu$
$\text{var}(X) = \text{var}(Y) = 1$