

Probability and Statistics

May 2018

1. Suppose that X has probability density function $f_X(x) = \lambda e^{-\lambda x}$ for $x \geq 0$. Compute the cumulative distribution function $F_X(x)$.
2. Suppose that X is a continuous random variable with the following probability density function:

$$f(x) = 3x^2$$

for $0 < x < 1$. Use the change-of-variable technique to find the probability density function of $Y = X^2$.

3. Suppose that Y has the following mgf.

$$M_Y(t) = \frac{e^t}{4 - 3e^t}, \quad t < -\ln(0.75)$$

- (a) Find $E(Y)$
- (b) Find $E(Y^2)$