Stat 2605 Tutorial 5

November 1, 2022

1. Suppose that X has an $\text{Exp}(\lambda = 2)$ distribution with pdf given by:

$$f(x) = \begin{cases} 2e^{-2x} & x > 0 \\ 0 & \text{otherwise} \end{cases}$$

   (a) Calculate $\mathbf{P}\left(X > 2\right)$.

   (b) If $X \sim \text{Exp}(\lambda = 2)$, what is $\mathbf{E}\left(X\right)$ and $\mathbf{Var}\left(X\right)$? Use this to calculate $\mathbf{E}\left(X^2\right)$.

2. Suppose $X \sim N(\mu = 4, \sigma^2 = 3^2)$. Calculate $\mathbf{P}\left(2 < X < 5\right)$.

3. Suppose X has pdf given by:

$$f(x) = \begin{cases} \dfrac{2(x+1)}{3} & 0 < x < 1 \\ 0 & \text{otherwise} \end{cases}$$

   Let $Y = e^X + 1$. Find the pdf of Y.

4. Let X have pdf given by:

$$f(x) = \begin{cases} 4x^3 & 0 \le x \le 1 \\ 0 & \text{otherwise} \end{cases}$$

   Let $Y = 1/\sqrt{X}$. Find the pdf of Y.

5. Suppose X has pdf given by:

$$f(x) = \begin{cases} \dfrac{3}{7}x^2 & 1 < x < 2 \\ 0 & \text{otherwise} \end{cases}$$

   Outline the steps required to simulate X by generating a $U \sim \text{Unif}(0,1)$.