Name: Feedback

SA402 · Dynamic and Stochastic Models Fall 2023 · Uhan

Quiz 5 – 10/4/2023

Problem	Weight	Score
1	1	
2	1	
3	1	
4	1	
Total		/ 40

Instructions. You have 10 minutes to complete this quiz. You may use your plebe-issue TI-36X Pro calculator. You may not use any other materials.

Show all your work. To receive full credit, your solutions must be completely correct, sufficiently justified, and easy to follow.

Problem 1. Let $Y \sim \text{Poisson}(5)$. Compute $\Pr\{Y > 3\}$.

See Problem 1c from the Lesson 8 Exercises for a similar example.

Problem 2. Let $Y \sim \text{Poisson}(73)$. Compute $E[Y]$.

See Problem 1d from the Lesson 8 Exercises for a similar example.

Problem 3. Let $T \sim \text{Erlang}(6, 1/2)$. Compute $\Pr\{T \le 2\}$.

See Problems 3a and 3c from the Lesson 8 Exercises for similar examples. Note that in this problem, you are being asked for $\Pr\{T \le 2\}$, which is slightly different from these examples.

Problem 4. Let $G \sim \text{Exponential}(1/5)$. Compute $\Pr\{4 < G < 6\}$.

See Problems 2a and 2b from the Lesson 8 Exercises for similar examples.

Note that G is a continuous random variable, so

$$\Pr\{4 < G < 6\} = \Pr\{4 \le G < 6\} = \Pr\{4 < G \le 6\} = \Pr\{4 \le G \le 6\}$$

	$X \sim \text{Poisson}(\mu)$	$X \sim \text{Exponential}(\lambda)$	$X \sim \text{Erlang}(n, \lambda)$
pmf / pdf	$p_X(a) = \begin{cases} \dfrac{e^{-\mu}\mu^a}{a!} & \text{if } a = 0, 1, 2, \dots \\ 0 & \text{o/w} \end{cases}$	$f_X(a) = \begin{cases} \lambda e^{-\lambda a} & \text{if } a \ge 0 \\ 0 & \text{o/w} \end{cases}$	$f_X(a) = \begin{cases} \dfrac{\lambda(\lambda a)^{n-1} e^{-\lambda a}}{(n-1)!} & \text{if } a \ge 0 \\ 0 & \text{o/w} \end{cases}$
cdf	$F_X(a) = \sum_{k=0}^{\lfloor a \rfloor} \dfrac{e^{-\mu}\mu^k}{k!}$	$F_X(a) = \begin{cases} 1 - e^{-\lambda a} & \text{if } a \ge 0 \\ 0 & \text{o/w} \end{cases}$	$F_X(a) = \begin{cases} 1 - \sum_{k=0}^{n-1} \dfrac{e^{-\lambda a}(\lambda a)^k}{k!} & \text{if } a \ge 0 \\ 0 & \text{o/w} \end{cases}$
expected value	$E[X] = \mu$	$E[X] = \dfrac{1}{\lambda}$	$E[X] = \dfrac{n}{\lambda}$
variance	$\text{Var}(x) = \mu$	$\text{Var}(X) = \dfrac{1}{\lambda^2}$	$\text{Var}(X) = \dfrac{n}{\lambda^2}$