

Name:

MATH 320: In-Class 11-2

1. A electronics website receives orders from all over the world at a mean rate of 150 per hour according to the Poisson process. Let X be the waiting time in minutes until the fifth order.
 - (a) Give the pdf of X .
 - (b) Find the mean and variance of X .
2. Let $X \sim \text{Gamma}(\alpha = 3, \beta = 1/2)$. Find the expected value of $Y = 30X + 6X^2$.
3. Find the following probabilities:
 - (a) $P(Z < 1.12)$.
 - (b) $P(Z > -0.34)$.
 - (c) If $X \sim \text{Normal}(\mu = 17, \sigma = 3)$, $P(13 \leq X < 22)$.

4. The lifetimes of light bulbs produced by a company are normally distributed with mean 150 hours and standard deviation 12.5 hours.

(a) Find the probability that a bulb will last at least 140 hours.

(b) If 4 new bulbs are installed at the same time, find the probability at least 3 of them will last more than 140 hours.

(c) If a pack of 32 light bulbs is installed, find the probability the *combined lifetime* will be less than 4720 hours.

5. If $X \sim \text{Normal}(\mu = 5.2, \sigma = 0.8)$ and $Y = e^X \implies Y \sim \text{Lognormal}$, find $P(100 \leq Y \leq 500)$.

6. If $X \sim \text{Normal}(\mu = 0.10, \sigma = 0.03)$ and $Y = 100e^X \implies Y \sim \text{Lognormal}$, find $P(Y \leq 107.50)$.

7. If $X \sim \text{Beta}(\alpha = 2, \beta = 3)$.

(a) Find $E(X)$ and $V(X)$.

(b) Find $P(X < 0.3)$.