

Homework # 4

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Problem 1

Statement

3.121 - (clearly show steps to achieve a written probability statement, then write the code you would use to find the probability in R/find probability using R)

Let Y denote a random variable that has a Poisson distribution with mean $\lambda = 2$. Find 1. $P(Y = 4)$ 2. $P(Y \geq 4)$ 3. $P(Y < 4)$ 4. $P(Y \geq 4 | Y \geq 2)$

Solution

Problem 2

Statement

3.128

Cars arrive at a toll both according to a Poisson process with mean 80 cars per hour. If the attendant makes a one-minute phone call, what is the probability that at least 1 car arrives during the call?

Solution

Problem 3

Statement

First, run the example R code provided, then answer the following question. On the same plotting region, plot the distribution of $Y \sim \text{Binomial}(n, p)$ and $W \sim \text{Poisson}(np)$ for $p = 0.1$ and varying values of n . Create a maximum of 3 plots and explain what you notice about Y and W as $n \rightarrow \infty$

Solution

Extra Credit

Statement

3.85

Find $E(Y(Y-1))$ for a geometric random variable Y by finding $\frac{d^2}{dq^2}(\sum_{y=1}^{\infty} q^y)$. Use this result to find the variance of Y .

Solution