

ITM529. Stochastic Processes

Short Quiz 4, 2025F, Weighting of 5%

Solution

Name: []

#1. Calls to a center follow a Poisson process with rate 120 calls per hour. Each call has probability 1/4 from a male customer. The call center opens at 9am each morning. What is the probability that there are exactly one calls in the first 2 minutes and exactly three calls from minute 1 to minute 4? [5pt]

$$\begin{aligned} & \mathbb{P}(N(2) = 1, N(4) - N(1) = 3) \\ &= \mathbb{P}(N(1) - N(0) = 1, N(2) - N(1) = 0, N(4) - N(2) = 3) \\ & \quad + \mathbb{P}(N(1) - N(0) = 0, N(2) - N(1) = 1, N(4) - N(2) = 2) \\ &= \lambda e^{-\lambda} \times e^{-\lambda} \times e^{-2\lambda} \frac{(2\lambda)^3}{6} + e^{-\lambda} \times \lambda e^{-\lambda} \times e^{-2\lambda} \frac{(2\lambda)^2}{2} \\ &= \frac{112}{3} e^{-8} \end{aligned} \tag{1}$$

Difficulty: Easy

Amount of work: 100%