Derivative HW7

LYU JIAMING

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1 PART A

The probability of the event given the arrival density is λ:

$$Prob(N_{t+\Delta t} - N_t = n) = e^{-\lambda \Delta t} \frac{(\lambda \Delta t)^n}{n!}, n = 0, 1...$$

Where $N_{t+\Delta t} - N_t$ represents the number of jumps happen in the time interval Δt. For the time interval$[0, T]$, the probability that there is exactly one jump is:

$$Prob(N_T = 1) = e^{-\lambda T} \lambda T$$

2 PART B

For the first event in Part B, the probability is:

$$P(N_{\frac{T}{2}} = 1) \times P(N_T - N_{\frac{T}{2}} = 0) = e^{-\lambda \frac{T}{2}} \lambda \times \frac{T}{2} \times e^{-\lambda \frac{T}{2}}$$

For the second event in PART B, the probability is:

$$P(N_{\frac{T}{2}} = 0) \times P(N_T - N_{\frac{T}{2}} = 1) = e^{-\lambda \frac{T}{2}} \times e^{-\lambda \frac{T}{2}} \times \lambda \times \frac{T}{2}$$

The sum of probabilities of the two events is $e^{-\lambda T} \lambda T$, which is the same as the result of part A.