

HW 9

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Q1

a

Let $T_0 = 0$ represent the time at 8 AM. Then the probability that no people show up from 8 to 10 AM is equal to

$$P(T_1 - T_0 > 2) = 1 - F_{exp(3)}(2) = 0.00248$$

b

T_n is a Poisson process with rate 3 so by definition, $T_1 - T_0 \sim exp(3)$

Q2

a

Let T_n be a Poisson process of cars passing through. Then let $T_0 = 0$ be the last time a car passed before the deer crosses the road. Then let $\alpha \geq 0$ be the time at which the deer crosses the road. Then the probability that a car hits the deer is equivalent to

$$P(T_k - \alpha < 1/12)$$

where $T_k = \min\{T_n : T_n > \alpha\}$ Because of the memoryless of the exponential distribution this is equal to,

$$\sum_{i>0} p(k=i)(F_{exp(6)}(1/12)) = (F_{exp(6)}(1/12)) \sum_{i>0} p(k=i) = (F_{exp(6)}(1/12)) = 0.39347$$