STAT 380

Problems: Assignment 5

1. Cosmic rays arrive at a particle detector according to a Poisson Process with rate 2.

   (a) Compute the probability that 4 cosmic rays arrived in a time period of length $t = 5$ starting from time $t = 0$ given that given that 8 cosmic rays arrived in the time period from $t = 0$ to $t = 8$.

   (b) Now suppose an arriving cosmic ray is detected with probability 0.8 independent of all other cosmic rays and the time at which the cosmic ray arrives. Compute the joint probability mass function of the number which are detected in $[0, 5]$, the number which arrive and are not detected in $[0, 5]$, the number which hare detected in the interval $(5, 8]$ and the number which arrive and are not detected in the interval $(5, 8]$.

   (c) Compute the probability that 4 cosmic rays arrived in a time period of length $t = 5$ starting from time $t = 0$ given that given that 8 cosmic rays were detected in the time period from $t = 0$ to $t = 8$.

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