10. Suppose that $E[N(t)] = t/3$. What is $P(N(4) = 0)$?

Solution: Since $E[N(t)] = t/3$, $N(t)$ must be a Poisson process with rate $\lambda = 1/3$. Thus,

$$P(N(4) = 0) = e^{-4\lambda} \frac{(4\lambda)^0}{0!} = e^{-4/3} = e^{-4/3}.$$

11. Let $X_1, X_2, \ldots$ be independent uniform (0,1) random variables, and define $Y$ by

$$Y = \min\{n : X_1 + X_2 + \cdots + X_n > 1\}.$$

What is $E[Y]$?

Solution:

$$E[Y] = E[N(1) + 1] = (e^1 - 1) + 1 = e.$$