Problems from Assignment 2

1. Remember, a continuous random variable is said to have an exponential distribution with rate λ written $X \sim \mathscr{E}(\lambda)$, if $\lambda > 0$ and the pdf of X is:

$$f_X(x) = \begin{cases} \lambda e^{-\lambda x} & x \geq 0 \\ 0 & x < 0. \end{cases}.$$

   Suppose $X_1, X_2 \overset{\text{iid}}{\sim} \mathscr{E}(\frac{1}{3})$.

   (a) Find $\mathrm{P}(X_2 = 2)$.

   (b) Find $\mathrm{P}(X_2 \geq 3)$.

   (c) Find $\mathrm{P}(X_2 \geq 3, X_1 \geq 1)$.

   (d) Find $\mathrm{P}(X_1 + X_2 \geq 4)$.

2. If X is normal with mean μ and variance σ^2 we write $X \sim N(\mu, \sigma^2)$ (notice the second parameter is the variance not the standard deviation that is different than the way it is sometimes written). Suppose $X_1, X_2 \overset{\text{iid}}{\sim} N(3, 9)$.

   (a) Find $\mathrm{P}(X_2 = 2)$.

   (b) Find $\mathrm{P}(X_2 \geq 3)$.

   (c) Find $\mathrm{P}(X_2 \geq 3, X_1 \geq 1)$.

   (d) Find $\mathrm{P}(X_1 + X_2 \geq 4)$.