

Problems from Assignment 2

1. Remember, a continuous random variable is said to have an exponential distribution with rate  $\lambda$  written  $X \sim \mathcal{E}(\lambda)$ , 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  $X_1, X_2 \stackrel{\text{iid}}{\sim} \mathcal{E}(\frac{1}{3})$ .

- (a) Find  $P(X_2 = 2)$ .
- (b) Find  $P(X_2 \geq 3)$ .
- (c) Find  $P(X_2 \geq 3, X_1 \geq 1)$ .
- (d) Find  $P(X_1 + X_2 \geq 4)$ .

2. If  $X$  is normal with mean  $\mu$  and variance  $\sigma^2$  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  $X_1, X_2 \stackrel{\text{iid}}{\sim} N(3, 9)$ .

- (a) Find  $P(X_2 = 2)$ .
- (b) Find  $P(X_2 \geq 3)$ .
- (c) Find  $P(X_2 \geq 3, X_1 \geq 1)$ .
- (d) Find  $P(X_1 + X_2 \geq 4)$ .