

## Homework 6

Do the problems on webwork and turn the following problems in class on Oct. 22st.

Homework should be written neatly and clearly explained. If it requires more than one sheet, the sheets must be stapled. Include your name and id number in the top right corner of your homework.

**Problem 1.** Let  $X$  be a random variable with pdf

$$f_X(x) = \begin{cases} 3e^{-x} & \text{if } x \in [0, a] \\ 0 & \text{otherwise} \end{cases}$$

for some constant  $a$ .

- (a) What value must  $a$  equal?
- (b) What is  $\mathbb{E}[X]$ ?

**Problem 2.** Let  $q > 0$  be a real number. Consider function  $f$  which has values

$$f(t) = \begin{cases} Ct^{-q}, & \text{for } t \geq 1 \\ 0, & \text{otherwise.} \end{cases}$$

- (a) For which values of  $q$  is there a constant  $C$  so that this function  $f$  is a probability density function for some continuous random variable? What is  $C$  in these cases?
- (b) For which values of  $q$  will this random variable have finite expectation? What is its expectation, when it exists?
- (c) For which values of  $q$  will this random variable have finite variance?