

**MATH 351**  
**Problem Set 6**  
**Due November 8, 2012**

1. Suppose

$$f(x) = \begin{cases} c(1 - x^2) & \text{if } -2 \leq x \leq 2 \\ 0 & \text{otherwise.} \end{cases}$$

Is there a value of  $c$  for which  $f$  is a probability density function? Why or why not?

2. Suppose that

$$f(x) = \begin{cases} c(3x - x^2) & \text{if } 0 \leq x \leq 2 \\ 0 & \text{otherwise} \end{cases}$$

is the probability density function of the random variable  $X$ .

- (a) Find  $c$ .
- (b) Find  $P\{-1 \leq x \leq 1\}$ .
- (c) Find  $E[X]$ .

3. Suppose  $X$  is a random variable with probability density function

$$f(x) = \begin{cases} cxe^{-x} & \text{if } x \geq 2 \\ 0 & \text{otherwise.} \end{cases}$$

- (a) Find  $c$ .
- (b) Find  $E[X]$ .

4. Describe, in words, whether you think the likelihood of a hurricane during a given period of time is best described in terms of a Poisson distribution or a uniform distribution. Give reasons for your answer.

5. Trains leaving Penn Station, New York to New Jersey leave the station every ten minutes. A man arrives at the station at a random time. Let  $X$  be the time he will have to wait for the next train to leave.

- (a) What kind of random variable is  $X$ ?
- (b) What is  $P\{X \geq 4\}$ ?

(c) Find  $E[X]$  and  $Var(X)$ .

6. Suppose that  $X$  is a uniform random variable on the interval  $[-1, 1]$ . Find the probability density functions of  $X$ ,  $|X|$ , and  $e^X$ .