Math 465 ASSIGNMENT 2 **Name:** _____

This assignment is due at the start of class on Monday, January 30th

1. A *discrete* random variable X has the cumulative distribution function $F(x)$ shown below and to the right.

x :

$f(x)$:

$$F(x) = \begin{cases} 0 & \text{for } x < 0 \\ \frac{1}{12} & \text{for } 0 \le x < 1 \\ \frac{6}{12} & \text{for } 1 \le x < 2 \\ \frac{10}{12} & \text{for } 2 \le x < 3 \\ 1 & \text{for } x \ge 3 \end{cases}$$

(a) Give each of the following probabilities based on F.

$P(X \le 2) =$ _____ $P(X \ge 2) =$ _____ $P(X = 1) =$ _____

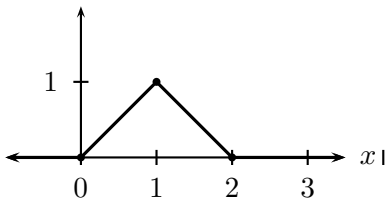
$P(X = 1\frac{1}{2}) =$ _____ $P(X \le 1\frac{1}{2}) =$ _____ $P(1 < X \le 3) =$ _____

(b) Give the probability distribution function f in the space above and to the left.

2. Give the value of c for which $f(x) = \dfrac{c}{x^2},\ x = 1, 3, 5$ is a discrete probability distribution. Show how you obtain it.

3. The probability density function, and its graph, for a **continuous** random variable X is shown below. Use it to find the things that follow. You can integrate, or simply use some geometry.

$$f(x) = \begin{cases} x & \text{for } 0 \le x < 1 \\ 2 - x & \text{for } 1 \le x \le 2 \\ 0 & \text{elsewhere} \end{cases}$$



(a) $P(X > \frac{1}{2}) =$ _____ (b) $P(X = \frac{1}{2}) =$ _____

(c) $P(\frac{1}{4} < X < \frac{3}{4}) =$ _____ (d) $F(\frac{5}{2}) =$ _____

4. An experiment consists of rolling a single die, so $S = \{1, 2, 3, 4, 5, 6\}$. The random variable X assigns to each outcome the number of letters it has when spelled as a word. For example, $X(5) = 4$ since the word *five* has four letters.

   (a) Fill in the blanks: $X(1) =$ _____ , $X(2) =$ _____ , $X(3) =$ _____

   (b) Give the range of X, using appropriate notation:

   (c) Give the event A (as a subset of the sample space) corresponding to $X = 4$:

   (d) Give the event B (as a subset of the sample space) corresponding to $X \geq 4$:

   (e) Fill in the blanks: $f(5) = P(X = 5) =$ _____ , f(3) = P(_____) = _____ ,

   $f($ _____ $) = P(X = 4) =$ _____, f(2) = P(_____) = _____

   (f) Fill in the blanks: $F(4) = P(X \leq 4) =$ _____ , F(7) = P(_____) = _____ ,

   $F($ _____ $) = P(X \leq 3.5) =$ _____, F(2) = P(_____) = _____

   (g) Give the probability distribution function f for this random variable **on the axes below and to the left**. Be sure to label the horizontal axis with all integers from the smallest value in Ran(X) to the largest value in Ran(X).

   (h) Give the cumulative probability distribution function F **on the axes above and to the right**.