Name:

MATH 320: Homework 8

Due _____: Turn in a hard copy, neat and stapled.

1. 5 cards are face down in a row on a table. Exactly one of them is an ace. You turn the cards over one at a time, moving from left to right. Let X be the random variable for the number of cards turned *before* an ace is turned over.

   Find the pmf for X. You can write it as a piecewise function or as a table.

2. Let X be the number of claims on an auto insurance policy having pmf

$$f(x) = \begin{cases} 0.9 & x = 0 \\ \frac{c}{x} & x = 1, 2, 3, 4, 5, 6 \end{cases}$$

   where c is a constant.

   (a) Determine the value of c that makes $f(x)$ a valid pmf.

   (b) Write the cdf $F(x)$ as a piecewise function (round to 4 decimals).

3. Let $f(x) = \frac{7}{256}x^6, \quad -c < x < c$. Find the constant c so that $f(x)$ is a valid pdf.

4. The lifetime of a machine part has a continuous distribution on the interval $(0, 10)$ with probability density function $f(x)$, where $f(x)$ is *proportional* to $(10 + x)^{-2}$.

   Calculate the probability that the lifetime of the machine part is less than 5.

5. Let X have the following density function:

$$f(x) = \begin{cases} x & 0 \le x \le 1 \\ 1/x^3 & 1 < x < \infty \\ 0 & \text{otherwise} \end{cases}$$

   (a) Find the cdf $F(x)$.

   (b) Plot the cdf $F(x)$.

   (c) Use the cdf $F(x)$ to find $P(0.5 \le X \le 5)$.

6. The loss due to water damage for a home is modeled by a random variable X with density function

$$f(x) = \begin{cases} 0.005(20 - x) & 0 \le x \le 20 \\ 0 & \text{elsewhere} \end{cases}$$

   Given that the water loss exceeds 6, calculate the probability that it exceeds 15.

Select answers

1.
2. (a) $c \approx 0.0408$

   (b)
3. $c = 2$
4. Prob ≈ 0.667
5. (a)

   (b)

   (c) Prob $= 0.855$
6. Prob ≈ 0.1276