

Math 122 - #9
Probability Density Functions

1. Determine the value of C so that $p(x)$ is a probability density function on the given interval.

a. $p(x) = C(15 - 3x)$ for $1 \leq x \leq 4$

b. $p(x) = Ce^{-6x}$ for $x \geq 0$

c. $p(x) = Cx^4(1 - x)$ for $0 \leq x \leq 1$

2. Let $p(x) = 3x^2$ for $0 \leq x \leq 1$.

a. Find $P(1/2 < X < 1)$

b. Find $P(X = 1/2)$

3. Let $p(x) = \frac{x^3}{5000}(10 - x)$ for $0 \leq x \leq 10$.

a. Find $P(1 \leq X \leq 4)$

b. Find $P(X \geq 6)$

4. Find the value of C so that $p(x) = \frac{C}{x^2 + 4}$ for the interval $-\infty < x < \infty$ is a probability density function?

5. Find the value of c so that $p(x) = \frac{x^3}{4}$ for the interval $0 < x < c$ is a probability density function?

6. A random variable X has probability density function $p(x) = \frac{3}{5}(4 - x^2)$ for $1 \leq x \leq 2$, find the expected value μ .

7. A random variable X has probability density function $p(x) = 1 - \frac{1}{8}x$ for $4 \leq x \leq 8$.

a. Find the expected value μ .

b. Determine the value of k so that $P(X > k) = 0.9$

Answers

1. a. $2/45$

b. 6

c. 30

2. a. $\frac{7}{8}$

b. 0

3. a. 0.08658

b. .66304

4. $\frac{2}{\pi}$

5. 2

6. 1.35

7. $\frac{16}{3}$

b. 4.2053