

2.1-3. For each of the following, determine the constant c so that $f(x)$ satisfies the conditions of being a pmf for a random variable X .

- (a) $f(x) = x/c$, $x = 1, 2, 3, 4$.
- (b) $f(x) = cx$, $x = 1, 2, 3, \dots, 10$.
- (c) $f(x) = c(x+1)^2$, $x = 0, 1, 2, 3$.

2.1-8. A fair four-sided die has two faces numbered 0 and two faces numbered 2. Another fair four-sided die has its faces numbered 0, 1, 4, and 5. The two dice are rolled. Let X and Y be the respective outcomes of the roll. Let $W = X + Y$.

- (a) Determine the pmf of W . as a table.
- (b) Write the cdf as a table.
- (c) Find $P(W < 5)$, $P(W \geq 2)$, and $P(1 \leq W \leq 4)$.
- (d) Plot the cdf.

2.1-12. Let X be the number of accidents per week in a factory. Let the pmf of X be

$$f(x) = \frac{1}{(x+1)(x+2)} = \frac{1}{x+1} - \frac{1}{x+2}, \quad x = 0, 1, 2, \dots$$

Find the conditional probability of $X \geq 4$, given that

3.1-2. Let $f(x) = 1/2$, $-1 \leq x \leq 1$, be the pdf of X .

- (a) Plot the pdf.
- (b) Find the cdf and plot it.
- (c) Find the median m , IQR , $E(X)$, and $V(X)$.
- (d) Find $E[-4X(1+X)]$.

3.1-16. Let $f(x) = (x+1)/2$, $-1 < x < 1$.

- (a) Find $P(X < -0.25)$ and $P(X \geq -0.25)$.
- (b) Find the 29th percentile.
- (c) Find the cutoff for the upper 33rd percent.
- (d) Using the cdf, find $P(-0.5 < X \leq 0.75)$ and $P(X > 0)$.
- (e) Find the mode.

3.1-7. For each of the following functions, (i) find the constant c so that $f(x)$ is a pdf of a random variable X , (ii) find the cdf, $F(x) = P(X \leq x)$, (iii) find μ and σ^2 :

- (a) $f(x) = 4x^c$, $0 \leq x \leq 1$.
- (b) $f(x) = c\sqrt{x}$, $0 \leq x \leq 4$.

2.2-2. Let the random variable X have the pmf

$$f(x) = \frac{(|x|+1)^2}{9}, \quad x = -1, 0, 1.$$

Compute $E(X)$, $E(X^2)$, and $E(3X^2 - 2X + 4)$.

and $V(X)$ by hand.

2.3-3. Given $E(X+4) = 10$ and $E[(X+4)^2] = 116$, determine (a) $\text{Var}(X+4)$, (b) $\mu = E(X)$, and (c) $\sigma^2 = \text{Var}(X)$.

2.3-8. Let X equal the larger outcome when a pair of fair four-sided dice is rolled. The pmf of X is

$$f(x) = \frac{2x-1}{16}, \quad x = 1, 2, 3, 4.$$

- (a) Find the mean, variance, and standard deviation of X . using your calculator.
- (b) If $Y = 2X - 1$, find $E(Y)$ and $SD(Y)$.

select Answers

2.1-3) a) $c = 10$

b) $c = 1/55$

c) $c = 1/30$

2.1-8) c) $P(W < 5) = 10/16$

$P(W \geq 2) = 12/16$

$P(1 \leq W \leq 4) = 8/16$

2.1-12) Prob = 0.4

3.1-2) c) $m = 0$, $IQR = 1$, $E(X) = 0$,

$V(X) = 1/3$

d) $E[-4X(1+X)] = -4/3$

3.1-16) a) $P(X < -0.25) = 9/64$

$P(X \geq -0.25) = 55/64$

b) $x_{0.29} \approx 0.0770$

d) $P(-0.5 < X \leq 0.75) \approx 0.7031$

$P(X > 0) = 0.75$

3.1-7) a) $c = 3$, $F(x) = x^4$, $E(X) = 4/5$, $V(X) = 2/75$

b) $c = 3/16$, $F(x) = (1/8)x^{3/2}$, $E(X) = 12/5$,

$V(X) = 192/175$

2.2-2) $E(X) = 0$, $E(X^2) = 8/9$, $E(3X^2 - 2X + 4) = 20/3$,

$V(X) = 8/9$

2.3-3) a) $V(X+4) = 16$

b) $E(X) = 6$

c) $V(X) = 16$

2.3-8) (a) $E(X) = 3.125$, $V(X) \approx 55/64$,

$SD(X) \approx 0.927$

(b) $E(Y) = 5.25$, $SD(Y) \approx 1.854$