

Answers to Exercises 12.1

1. $E(X) = 4/5$, $V(X) = .16$, standard deviation = .4.
2. $E(X) = 5/3$, $V(X) = 4/9$, standard deviation = $2/3$.
3. (a) $V(X) = 1$
 (b) $V(X) = 4$
 (c) $V(X) = 16$

As the difference between maximum and minimum values increases, so does the variance.

4. (a) $V(X) = 2.6$
 (b) $V(X) = 5.8$

Values of (b) farther from $E(X)$ have higher probabilities, so the variance is larger.

5. (a)

Value	Probability
0	$11/52$
1	$26/52$
2	$13/52$
3	$2/52$

(b) $E(X) = 29/26 \approx 1.12$.

(c) $E(X)$ is the average number of accidents per week in the given year.

6. (a)

Value	Probability
0	$30/60$
1	$20/60$
2	$10/60$

(b) $E(X) = 2/3$

(c) $E(X)$ is the average number of calls coming into the switchboard each minute.

7. (a) 25
 (b) $100c^2\%$.
8. (a) $1/2$
 (b) $1/4$
 (c) $1/100$
 (d) 0

9. If X is the grower's profit if the fruits are not protected, then $E(X) = 90,000 < 95,000$, so he should spend \$5000 to protect the fruit.
10. Let X be the random variable defined in the previous exercise. In this case $E(X) = 96,000 > 95,000$, so the grower should not spend money to protect the fruit.

Answers to Exercises 12.2

For each of the problems 1–6, verify that the given function f is nonnegative, and that the area under the curve f and above the x axis is 1.

7. $k = 1/4$
7. $k = 3/8$
7. $k = 1/15$

- 7. $k = 1/2$
- 7. $k = 12$
- 7. $k = 2/9$
- 15. $1/15$
- 25. $.24$
- 35. $1/2$
- 45. $5/9$
- 55. $3/4$
- 65. $22/25$
- 75. $(x - 1)^{-1/2}/4$
- 85. $8x^{-3}/3$
- 95. $(x - 2)/5$
- 105. $F(x) = 3x/2 - x^2/4 - 5/4$
- 115. (a) $19/63$
 - (b) $F(x) = (x^3 - 1)/63$
 - (c) $F(3) - F(2) = 19/63.$
- 125. (a) $5/27$
 - (b) $F(x) = 2x^2/9 - x^3/27 - 5/27$
 - (c) $F(4) - F(3) = 5/27$
- 31. $2 - \sqrt{2}$
- 32. $M = 10 \ln(1.1)/\ln 2$
- 33. $b = 1.8$
- 34. $a = \sqrt{3}$
- 35. $b = .6$
- 36. $b = 3/2$
- 37. (b) $F(x) = 1 - x^{-4}$, (c) $\Pr(1 \leq X \leq 2) = 15/16$. $\Pr(X \geq 2) = 1/16$.
- 38. (b) $F(x) = 1 - (x + 1)^{-2}$, (c) $\Pr(1 \leq X \leq 2) = 5/36$. $\Pr(X \geq 3) = 1/16$.