Chapter 4 Homework Solutions

1. a. 0.1

b.

| X | P(X=x) | x · P(X=x) |
|---|---|---|
| 0 | 0.3 | 0 |
| 1 | 0.2 | 0.2 |
| 2 | 0.1 | 0.2 |
| 3 | 0.4 | 1.2 |
| | | $\mu = 1.6$ |

2. a. value of winnings

b. X = winnings

c. 10, 5, −6

d/e

| X | P(X=x) | x · P(X=x) |
|---|---|---|
| 10 | 1/6 | 10/6 |
| 5 | 2/6 | 10/6 |
| −6 | 3/6 | −18/6 |
| | | $\mu = +2/6 \approx +0.33$ |

f. Yes. The expected winnings are positive.

3. a,b

Investment 1

| X | P(X=x) | x · P(X=x) |
|---|---|---|
| 5,000,000 | 0.10 | 500,000 |
| 1,000,000 | 0.30 | 300,000 |
| −1,000,000 | 0.60 | −600,000 |
| | | $\mu = 200,000$ |

Investment 2

| X | P(X=x) | x · P(X=x) |
|---|---|---|
| 3,000,000 | 0.20 | 600,000 |
| 1,000,000 | 0.40 | 400,000 |
| −1,000,000 | 0.40 | −400,000 |
| | | $\mu = 600,000$ |

Investment 3

| x | P(X=x) | x · P(X=x) |
|---|---|---|
| 6,000,000 | 0.10 | 600,000 |
| 0 | 0.70 | 0 |
| −1,000,000 | 0.20 | −200,000 |
| | | $\mu = 400,000$ |

c. Third, the probability of losing one million dollars is smallest.

d. First, the probability of losing one million dollars is largest.

e. Second

4. a. winnings

b. X = profit (after spending $20 on tickets)

c. −20, 130

d,e

| X | P(X=x) | x · P(X=x) |
|---|---|---|
| −20 | 96/100 | −19.2 |
| 130 | 4/100 | 5.2 |
| | | $\mu = -14$ = expected average winnings per game |

5. a. 0.20

b. average family size

c.

| X | P(X=x) | x · P(X=x) |
|---|---|---|
| 0 | 0.10 | 0 |
| 1 | 0.20 | 0.20 |
| 2 | 0.30 | 0.60 |
| 3 | 0.20 | 0.60 |
| 4 | 0.10 | 0.40 |
| 5 | 0.05 | 0.25 |
| 6 | 0.05 | 0.25 |
| | | $\mu = 2.3$ |

d. 2-3 children (probability = 0.50)

6. a. X = number of years to get a B.S.

b. No one received their B.S. in 0, 1, or 2 years

c.

| x | P(X=x) | x · P(X=x) |
|---|---|---|
| 3 | 0.05 | 0.15 |
| 4 | 0.40 | 1.6 |
| 5 | 0.30 | 1.5 |
| 6 | 0.15 | 0.9 |
| 7 | 0.10 | 0.7 |
| | | $\mu = 4.85$ years |

7. a. $X$ = number of dice that show 1 (out of 6)

b. $0, 1, 2, 3, 4, 5, 6$

c. $X \sim B(6, 1/6)$

d. $\mu = 6\left(\frac{1}{6}\right) = 1$

e. $P(X=6) = \text{binompdf}\left(6, \frac{1}{6}, 6\right) = 0.00002$

f. $P(X=3) = \text{binompdf}\left(6, \frac{1}{6}, 3\right) = 0.054$ ← more likely that 3 dice will show a 1

$P(X=4) = \text{binompdf}\left(6, \frac{1}{6}, 4\right) = 0.008$

8. a. $X$ = number of schools in a sample of 13 offering distance learning courses

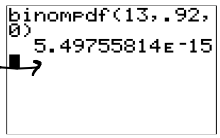
b. $0, 1, \ldots 13$

c. $X \sim B(13, 0.92)$

d. $\mu = 13 \cdot (0.92) = 11.96$

e. $P(X \leq 6) = \text{binomcdf}(13, 0.92, 6) = 0.00002$

f. $P(X=0) = \text{binompdf}(13, 0.92, 0) = 0.000000000000005$




$P(X=13) = \text{binomcdf}(13, 0.92, 13) = 0.338$

It is more likely that 13 will offer distance learning courses.

9. a. $X$ = number attending Tet festivities in a sample of 12

b. $0, 1, 2, \ldots 12$

c. $X \sim B(12, 0.18)$

d. $\mu = 12 \cdot (0.18) = 2.16$

e. $P(X \leq 4) = \text{binomcdf}(12, 0.18, 4) = 0.951$

f. $P(X>2) = 1 - P(X \leq 2) = 1 - \text{binomcdf}(12, 0.18, 2) = 0.370$

↑ complementary events ↑

10. a. $X$ = number of students in a sample of 22 that attend graduation

b. $0, 1, 2, 3, \ldots 22$

c. $X \sim B(22, 0.85)$

d. $\mu = 22(0.85) = 18.7$

e. $P(X=17) + P(X=18) = \text{binompdf}(22, 0.85, 17) + \text{binompdf}(22, 0.85, 18)$

$= 0.425$

11. a. $X$ = number of fencers in a sample of 25 fencers who do not use the foil as their main weapon

b. $0, 1, 2, 3, \ldots 25$

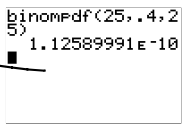
c. $X \sim B(25, 0.40)$

d. $\mu = (25)(0.40) = 10$

e. $P(X=6) = \text{binompdf}(25, 0.40, 6) = 0.044$

f. $P(X=25) = \text{binompdf}(25, 0.40, 25) = 0.0000000001$

yes




12. a. $X$ = number in a sample of 60 seniors who participate in after-school sports

b. $0, 1, 2, 3, \ldots 60$

c. $X \sim B(60, 0.08)$

d. $\mu = (60)(0.08) = 4.8$

e. $P(X=0) = \text{binompdf}(60, 0.08, 0) = 0.007$. Yes

f. $P(X=4) = \text{binompdf}(60, 0.08, 4) = 0.187$

$P(X=5) = \text{binompdf}(60, 0.08, 5) = 0.182$

It is more likely that 4 participated.

13. a. X = number of cookies in a bag of 144 that contain an extra fortune

b. $0, 1, 2, \ldots 144$

c. $X \sim B(144, 0.03)$

d. $\mu = (144)(0.03) = 4.32$

e. $P(X=0) = \text{binompdf}(144, 0.03, 0) = 0.012$

f. $P(X>3) = 1 - P(X \leq 3) = 1 - \text{binomcdf}(144, 0.03, 3) < 0.630$