4.13: Solutions

1.

Table 4.13.1

x	$P(x)$
0	0.12
1	0.18
2	0.30
3	0.15
4	0.10
5	0.10
6	0.05

3. 0.10 + 0.05 = 0.15

5. 1

7. 0.35 + 0.40 + 0.10 = 0.85

9. 1(0.15) + 2(0.35) + 3(0.40) + 4(0.10) = 0.15 + 0.70 + 1.20 + 0.40 = 2.45

11.

Table 4.13.2

x	$P(x)$
0	0.03
1	0.04
2	0.08
3	0.85

13. Let $X =$ the number of events Javier volunteers for each month.

15.

Table 4.13.3

x	$P(x)$
0	0.05
1	0.05
2	0.10
3	0.20
4	0.25
5	0.35

17. 1 – 0.05 = 0.95

18. $X =$ the number of business majors in the sample.

19. 2, 3, 4, 5, 6, 7, 8, 9

20. $X =$ the number that reply “yes”

22. 0, 1, 2, 3, 4, 5, 6, 7, 8

24. 5.7

26. 0.4151

28. $X =$ the number of freshmen selected from the study until one replied "yes" that same-sex couples should have the right to legal marital status.

30. 1,2,…

32. 1.4

35. 0, 1, 2, 3, 4, …

37. 0.0485

39. 0.0214

41. $X =$ the number of U.S. teens who die from motor vehicle injuries per day.

43. 0, 1, 2, 3, 4, ...

45. No

48.

a. X = the number of pages that advertise footwear
b. 0, 1, 2, 3, ..., 20
c. 3.03
d. 1.5197

50.

a. X = the number of Patriots picked
b. 0, 1, 2, 3, 4
c. Without replacement

53. $X =$ the number of patients calling in claiming to have the flu, who actually have the flu. X = 0, 1, 2, ...25

55. 0.0165

57.

a. X = the number of DVDs a Video to Go customer rents
b. 0.12
c. 0.11
d. 0.77

59. 4.43

61. c

63.

- X = number of questions answered correctly
- X ~ B(32, 13)(32, 13)
- We are interested in MORE THAN 75% of 32 questions correct. 75% of 32 is 24. We want to find $P(x > 24)$. The event "more than 24" is the complement of "less than or equal to 24."
- $P(x > 24) = 0$
- The probability of getting more than 75% of the 32 questions correct when randomly guessing is very small and practically zero.

65.

a. X = the number of college and universities that offer online offerings.
b. 0, 1, 2, …, 13

c. $X \sim B(13, 0.96)$
d. 12.48
e. 0.0135
f. $P(x = 12) = 0.3186$ $P(x = 13) = 0.5882$ More likely to get 13.

67.

- X = the number of fencers who do **not** use the foil as their main weapon
- 0, 1, 2, 3,... 25
- $X \sim B(25,0.40)$
- 10
- 0.0442
- The probability that all 25 not use the foil is almost zero. Therefore, it would be very surprising.

69.

a. X = the number of audits in a 20-year period
b. 0, 1, 2, …, 20
c. $X \sim B(20, 0.02)$
d. 0.4
e. 0.6676
f. 0.0071

71.

1. X = the number of matches
2. 0, 1, 2, 3
3. In dollars: −1, 1, 2, 3
4. 1212
5. The answer is −0.0787. You lose about eight cents, on average, per game.
6. The house has the advantage.

73.

a. $X \sim B(15, 0.281)$

b. i. Mean = $\mu = np = 15(0.281) = 4.215$
ii. Standard Deviation = $\sigma = \sqrt{npq} = \sqrt{15(0.281)(0.719)} = 1.7409$

c. $P(x > 5)=1 – 0.7754 = 0.2246$
$P(x = 3) = 0.1927$
$P(x = 4) = 0.2259$
It is more likely that four people are literate that three people are.

75.

a. X = the number of adults in America who are surveyed until one says he or she will watch the Super Bowl.
b. $X \sim G(0.40)$
c. 2.5
d. 0.0187
e. 0.2304

77.

a. X = the number of pages that advertise footwear
b. X takes on the values 0, 1, 2, ..., 20
c. $X \sim B$(20, 2919229192)
d. 3.02
e. No
f. 0.9997
g. X = the number of pages we must survey until we find one that advertises footwear. $X \sim G$(2919229192)
h. 0.3881
i. 6.6207 pages

79. 0, 1, 2, and 3

81.

a. $X \sim G(0.25)$

b. i. Mean = μ = 1p1p = 10.2510.25 = 4
ii. Standard Deviation = σ = 1−pp2−−−√1−pp2 = 1−0.250.252−−−−−√1−0.250.252 ≈ 3.4641

c. $P(x = 10) = 0.0188$
d. $P(x = 20) = 0.0011$
e. $P(x \leq 5) = 0.7627$

82.

a. $X \sim P(5.5)$; $\mu = 5.5$; σ = 5.5−−−√σ = 5.5 ≈ 2.3452
b. $P(x \leq 6) \approx 0.6860$
c. There is a 15.7% probability that the law staff will receive more calls than they can handle.
d. $P(x > 8) = 1 - P(x \leq 8) \approx 1 - 0.8944 = 0.1056$

84.

Let X = the number of defective bulbs in a string.

Using the Poisson distribution:

- $\mu = np = 100(0.03) = 3$
- $X \sim P(3)$
- $P(x \leq 4) \approx 0.8153$

Using the binomial distribution:

- $X \sim B(100, 0.03)$
- $P(x \leq 4) = 0.8179$

The Poisson approximation is very good—the difference between the probabilities is only 0.0026.

86.

a. X = the number of children for a Spanish woman
b. 0, 1, 2, 3,...
c. 0.2299
d. 0.5679
e. 0.4321

88.

a. X = the number of fortune cookies that have an extra fortune
b. 0, 1, 2, 3,... 144
c. 4.32
d. 0.0124 or 0.0133
e. 0.6300 or 0.6264
f. As n gets larger, the probabilities get closer together.

90.

a. X = the number of people audited in one year
b. 0, 1, 2, ..., 100
c. 2
d. 0.1353
e. 0.3233

92.

a. X = the number of shell pieces in one cake
b. 0, 1, 2, 3,...
c. 1.5
d. 0.2231
e. 0.0001
f. Yes

94. d