

Business Statistics, 9e (Groebner/Shannon/Fry)
Chapter 5 Discrete Probability Distributions

1) A random variable is generated when a variable's value is determined by using classical probability.

Answer: FALSE

Diff: 1

Keywords: random, variable, probability

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

2) The only two types of random variables are discrete and continuous random variables.

Answer: TRUE

Diff: 1

Keywords: random, discrete, continuous

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

3) If a random variable is discrete, it means that the outcome for the random variable can take on only one of two possible values.

Answer: FALSE

Diff: 1

Keywords: random, discrete, variable

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

4) The random variable, number of customers entering a store between 9 AM and noon, is an example of a discrete random variable.

Answer: TRUE

Diff: 1

Keywords: discrete, random, variable

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

5) When a single value is randomly chosen from a discrete distribution, the different possible values are mutually exclusive.

Answer: TRUE

Diff: 2

Keywords: discrete, random, variable

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

6) The graph of a discrete random variable looks like a histogram where the probability of each possible outcome is represented by a bar.

Answer: TRUE

Diff: 1

Keywords: discrete, random, variable

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

7) When a market research manager records the number of potential customers who were surveyed indicating that they like the product design, the random variable, number who like the design, is a discrete random variable.

Answer: TRUE

Diff: 1

Keywords: discrete, random, variable

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

8) The time required to assemble two components into a finished part is recorded for each employee at the plant. The resulting random variable is an example of a continuous random variable.

Answer: TRUE

Diff: 1

Keywords: continuous, random, variable

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

9) The Colbert Real Estate Agency has determined the number of home showings given by its agents is the same each day of the week. Then the variable, number of showings, is a continuous distribution.

Answer: FALSE

Diff: 1

Keywords: discrete, continuous, random, variable

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

10) The Cromwell Construction Company has the opportunity to enter into a contract to build a mountain road. The following table shows the probability distribution for the profit that could occur if it takes the contract:

Profit	Probability
\$30,000	0.15
\$50,000	0.20
\$70,000	0.30
\$100,000	0.35

Based on this information, the probability of profit being at least \$70,000 is 0.65.

Answer: TRUE

Diff: 1

Keywords: discrete, random, variable

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

11) The Cromwell Construction Company has the opportunity to enter into a contract to build a mountain road. The following table shows the probability distribution for the profit that could occur if it takes the contract:

Profit	Probability
\$30,000	0.15
\$50,000	0.20
\$70,000	0.30
\$100,000	0.35

Based on this information, the expected profit for the company if it takes the contract is \$70,500.

Answer: TRUE

Diff: 2

Keywords: mean, discrete, random, variable

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

12) The Cromwell Construction Company has the opportunity to enter into a contract to build a mountain road. The following table shows the probability distribution for the profit that could occur if it takes the contract:

Profit	Probability
\$30,000	0.15
\$50,000	0.20
\$70,000	0.30
\$100,000	0.35

Based on this information, the expected profit for the company if it takes the contract is \$60,000.

Answer: FALSE

Diff: 2

Keywords: mean, discrete random, variable

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

13) A probability distribution with an expected value greater than the expected value of a second probability distribution will also have a higher standard deviation.

Answer: FALSE

Diff: 2

Keywords: discrete, random, standard deviation, expected value

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

14) The Cromwell Construction Company has the opportunity to enter into a contract to build a mountain road. The following table shows the probability distribution for the profit that could occur if it takes the contract:

Profit	Probability
\$30,000	0.15
\$50,000	0.20
\$70,000	0.30
\$100,000	0.35

Based on this information, the probability of profit being at least \$50,000 is 0.50.

Answer: FALSE

Diff: 1

Keywords: discrete, random

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

15) The Cromwell Construction Company has the opportunity to enter into a contract to build a mountain road. The following table shows the probability distribution for the profit that could occur if it takes the contract:

Profit	Probability
\$30,000	0.15
\$50,000	0.20
\$70,000	0.30
\$100,000	0.35

Based on this information, the profit standard deviation for the company if it takes the contract is \$11,235.

Answer: FALSE

Diff: 2

Keywords: discrete, random, standard deviation

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

16) The number of no-shows each day for dinner reservations at the Cottonwood Grille is a discrete random variable with the following probability distribution:

No-shows	Probability
0	0.30
1	0.20
2	0.20
3	0.15
4	0.15

Based on this information, the expected number of no-shows is 1.65 customers.

Answer: TRUE

Diff: 2

Keywords: expected value, discrete

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

17) The number of no-shows for dinner reservations at the Cottonwood Grille is a discrete random variable with the following probability distribution:

No-shows	Probability
0	0.30
1	0.20
2	0.20
3	0.15
4	0.15

Based on this information, the most likely number of no-shows on any given day is 0 customers.

Answer: TRUE

Diff: 2

Keywords: discrete distribution

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

18) The number of no-shows each day for dinner reservations at the Cottonwood Grille is a discrete random variable with the following probability distribution:

No-shows	Probability
0	0.30
1	0.20
2	0.20
3	0.15
4	0.15

Based on this information, the standard deviation for the number of no-shows is about 0.36 customers.

Answer: FALSE

Diff: 2

Keywords: standard deviation, discrete

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

19) The Ski Patrol at Criner Mountain Ski Resort has determined the following probability distribution for the number of skiers that are injured each weekend:

Injured Skiers	Probability
0	0.05
1	0.15
2	0.40
3	0.30
4	0.10

Based on this information, the expected number of injuries per weekend is 2.25.

Answer: TRUE

Diff: 2

Keywords: expected value, discrete

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

20) The Ski Patrol at Criner Mountain Ski Resort has determined the following probability distribution for the number of skiers that are injured each weekend:

Injured Skiers	Probability
0	0.05
1	0.15
2	0.40
3	0.30
4	0.10

Based on this information, the standard deviation for the number of injuries per weekend is 2.25.

Answer: FALSE

Diff: 2

Keywords: standard deviation, expected value, discrete

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

21) Holmstead Company owns two small engine repair stores. The expected value of the number of complaints received per month at store 1 is 4.5 complaints. Further, the expected number of complaints per month for store 1 and store 2 combined is 13.6. This means the expected number of complaints per month at store 2 must be 9.1 complaints.

Answer: TRUE

Diff: 2

Keywords: expected value, sum, discrete

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

22) In a Florida town, the probability distribution for the number of legitimate emergency calls per day for the Fire Department is given as follows. Also shown is the probability distribution for the number of false alarms:

Legitimate		False Alarms	
<u>x</u>	<u>P(x)</u>	<u>y</u>	<u>P(y)</u>
0	.40	0	.80
1	.20	1	.15
2	.15	2	.05
3	.15		
4	.10		

Given this information, the expected number of total calls to the fire department is 1.60 calls.

Answer: TRUE

Diff: 3

Keywords: expected value, discrete

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

23) The Ace Construction Company has entered into a contract to widen a street in Boston. The possible payoffs for this project have been determined by management. The probabilities for these payoffs could be determined using a binomial distribution.

Answer: FALSE

Diff: 1

Keywords: probability, distribution

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

24) A construction company has found it has a probability of 0.10 of winning each time it bids on a project. The probability of winning a given number of projects out of 12 bids could be determined with a binomial distribution.

Answer: TRUE

Diff: 1

Keywords: binomial, distribution

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

25) Six managers at a company all enjoy golf. Each Saturday, four of the six get together for 18 holes of golf. They have decided to set up a schedule so that the same foursome does not play twice before all possible foursomes have played. The number of weekends that will pass before the same group would play twice is 15.

Answer: TRUE

Diff: 2

Keywords: combination

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

26) Bill Price is a sales rep in northern California representing a line of athletic socks. Each day, he makes 10 sales calls. The chance of making a sale on each call is thought to be 0.30. The probability that he will make exactly two sales is approximately 0.2335.

Answer: TRUE

Diff: 2

Keywords: binomial formula, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

27) One of the characteristics of the binomial distribution is that the probability of success for each trial depends on whether the previous trial was a success or not.

Answer: FALSE

Diff: 2

Keywords: binomial distribution

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

28) Each week American Stores receives a shipment from a supplier. The contract specifies that the maximum allowable percent defective is 5 percent. When the shipment arrives, a sample of 20 parts is randomly selected. If 2 or more of the sampled parts are defective, the shipment is rejected and returned to the supplier. Assume that a shipment arrives that actually has 4 percent defective parts and the distribution of defective parts is described by a binomial distribution. The probability that the shipment is rejected is approximately 0.19.

Answer: TRUE

Diff: 2

Keywords: binomial formula, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

29) Each week American Stores receives a shipment from a supplier. The contract specifies that the maximum allowable percent defective is 5 percent. When the shipment arrives, a sample of 20 parts is randomly selected. If 2 or more of the sampled parts are defective, the shipment is rejected and returned to the supplier. Assume that a shipment arrives that actually has 4 percent defective parts and the distribution of defective parts is described by a binomial distribution. The probability that the shipment is accepted is approximately 0.81

Answer: TRUE

Diff: 2

Keywords: binomial, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

30) A pizza restaurant uses 7 different toppings on its pizzas. At lunch time it has a pizza buffet and makes pizzas with 2 toppings. If it wants to serve every possible combination of 2 toppings, it would need to make 14 different pizzas.

Answer: FALSE

Diff: 2

Keywords: combinations

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

31) Ace Computer Manufacturer buys disk drives in lots of 5,000 units from a supplier in California. The contract calls for, at most, 3 percent of the disk drives to be defective. When a shipment arrives, a sample of $n = 15$ parts is selected. If zero defects are found in this sample, the shipment is accepted. If 3 or more defects are found, the shipment is rejected and sent back to the supplier. If the number of defects found is 1 or 2, a second sample of 15 parts is selected. If this sample yields 1 or fewer defects, the shipment is accepted; otherwise the shipment is rejected. Based on a binomial distribution, the probability that Ace will reject a shipment of parts that meets the contract requirements is approximately 0.0355.

Answer: TRUE

Diff: 3

Keywords: binomial, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

32) When using the binomial distribution, the maximum possible number of success is the number of trials.

Answer: TRUE

Diff: 1

Keywords: binomial, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

33) The Nationwide Motel Company has determined that 70 percent of all calls for motel reservations request nonsmoking rooms. Recently, the customer service manager for the company randomly selected 25 calls. Assuming that the distribution of calls requesting nonsmoking rooms is described by a binomial distribution, the expected number of requests for nonsmoking rooms is 14.

Answer: FALSE

Diff: 1

Keywords: binomial, expected value

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

34) The Nationwide Motel Company has determined that 70 percent of all calls for motel reservations request nonsmoking rooms. Recently, the customer service manager for the company randomly selected 25 calls. Assuming that the distribution of calls requesting nonsmoking rooms is described by a binomial distribution, the standard deviation of requests for nonsmoking rooms is 5.25 customers.

Answer: FALSE

Diff: 2

Keywords: binomial, standard deviation

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

35) The Nationwide Motel Company has determined that 70 percent of all calls for motel reservations request nonsmoking rooms. Recently, the customer service manager for the company randomly selected 25 calls. Assuming that the distribution of calls requesting nonsmoking rooms is described by a binomial distribution, the probability that more than 20 customers in the sample will request nonsmoking rooms is approximately 0.09.

Answer: TRUE

Diff: 2

Keywords: binomial, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

36) The Nationwide Motel Company has determined that 70 percent of all calls for motel reservations request nonsmoking rooms. Recently, the customer service manager for the company randomly selected 25 calls. Assuming that the distribution of calls requesting nonsmoking rooms is described by a binomial distribution, the probability that fewer than 5 customers will request smoking rooms is approximately 0.09.

Answer: TRUE

Diff: 2

Keywords: binomial, probability, complement

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

37) The distribution for the number of emergency calls to a city's 911 emergency number in a one-hour time period is likely to be described by a binomial distribution.

Answer: FALSE

Diff: 2

Keywords: distribution, Poisson

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

38) One difference between the binomial distribution and Poisson distribution is that the binomial's upper bound is the number of trials while the Poisson has no particular upper bound.

Answer: TRUE

Diff: 2

Keywords: binomial, Poisson

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

39) The number of defects discovered in a random sample of 100 products produced at the Berdan Manufacturing Company is binomially distributed with $p = .03$. Based on this, the standard deviation of the number of defects per sample of size 100 is 2.91.

Answer: FALSE

Diff: 2

Keywords: binomial, standard deviation

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

40) A direct marketing company believes that the probability of making a sale when a call is made to an individual's home is .02. The probability of making 2 or 3 sales in a sample of 20 calls is .0593.

Answer: TRUE

Diff: 2

Keywords: binomial, combination

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

41) A company has 20 copy machines and every day there is a 5 percent chance for each machine that it will not be working that day. If the company wants to calculate the probability of, say, 2 machines not working, it should use the Poisson distribution.

Answer: FALSE

Diff: 2

Keywords: binomial, Poisson

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

42) The Hawkins Company randomly samples 10 items from every large batch before the batch is packaged and shipped. According to the contract specifications, 5 percent of the items shipped can be defective. If the inspectors find 1 or fewer defects in the sample of 10, they ship the batch without further inspection. If they find 2 or more, the entire batch is inspected. Based on this sampling plan, the probability that a batch that meets the contract requirements will be shipped without further inspection is approximately .9139.

Answer: TRUE

Diff: 2

Keywords: binomial, combination

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

43) The Hawkins Company randomly samples 10 items from every large batch before the batch is packaged and shipped. According to the contract specifications, 5 percent of the items shipped can be defective. If the inspectors find 1 or fewer defects in the sample of 10, they ship the batch without further inspection. If they find 2 or more, the entire batch is inspected. Based on this sampling plan, the probability that a batch that contains twice the amount of defects allowed by the contract requirements will be shipped without further inspection is approximately .3874.

Answer: FALSE

Diff: 3

Keywords: binomial, combination

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

44) The Hawkins Company randomly samples 10 items from every large batch before the batch is packaged and shipped. According to the contract specifications, 5 percent of the items shipped can be defective. If the inspectors find 1 or fewer defects in the sample of 10, they ship the batch without further inspection. If they find 2 or more, the entire batch is inspected. Based on this sampling plan, the probability that a batch that meets the contract requirements will end up being 100 percent inspected is approximately .0746.

Answer: FALSE

Diff: 3

Keywords: binomial, combination

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

45) The probability of the outcome changes from trial to trial in a binomial experiment.

Answer: FALSE

Diff: 2

Keywords: discrete, binomial

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

46) The primary difference between the binomial distribution and the Poisson distribution is that the Poisson is used to describe a continuous random variable and the binomial is used for discrete random variables.

Answer: FALSE

Diff: 1

Keywords: binomial, Poisson, distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

47) The number of calls to an Internet service provider during the hour between 6:00 and 7:00 p.m. is described by a Poisson distribution with mean equal to 15. Given this information, the expected number of calls in the first 30 minutes is 7.5 calls.

Answer: TRUE

Diff: 1

Keywords: Poisson, expected value

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

48) The number of calls to an Internet service provider during the hour between 6:00 and 7:00 p.m. is described by a Poisson distribution with mean equal to 15. Given this information, the standard deviation for the call distribution is about 3.87 calls.

Answer: TRUE

Diff: 2

Keywords: Poisson, standard deviation

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

49) The number of customers who arrive at a fast food business during a one-hour period is known to be Poisson distributed with a mean equal to 8.60. The probability that exactly 8 customers will arrive in a one-hour period is 0.1366.

Answer: TRUE

Diff: 1

Keywords: Poisson, probability

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

50) The number of customers who arrive at a fast food business during a one-hour period is known to be Poisson distributed with a mean equal to 8.60. The probability that more than 4 customers will arrive in a 30-minute period is 0.1933.

Answer: FALSE

Diff: 2

Keywords: Poisson, probability

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

51) The number of customers who arrive at a fast food business during a one-hour period is known to be Poisson distributed with a mean equal to 8.60. The probability that between 2 and 3 customers inclusively will arrive in one hour is 0.0263.

Answer: TRUE

Diff: 2

Keywords: Poisson, probability

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

52) The Brockingham Carpet Company prides itself on high quality carpets. At the end of each day, the company quality managers select 3 square yards for inspection. The quality standard requires an average of no more than 2.3 defects per square yard. The expected number of defects that the inspector will find during the inspection is 6.9.

Answer: TRUE

Diff: 2

Keywords: Poisson, expected value

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

53) The Brockingham Carpet Company prides itself on high quality carpets. At the end of each day, the company quality managers select 3 square yards for inspection. The quality standard requires an average of no more than 2.3 defects per square yard. Last night, the inspector found 8 defects in the sample of 3 square yards. The chance of finding 8 or more defects in the sample is 0.9975.

Answer: FALSE

Diff: 2

Keywords: Poisson, probability

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

54) The makers of Crustfree Bread in Boston have a quality standard that allows no more than 3 burned loaves per batch on average. Recently, the manager inspected a batch and found 5 burned loaves. She did not appear to be upset at the production meeting. This is because the chance of exactly 5 burned loaves occurring is 0.1008.

Answer: TRUE

Diff: 2

Keywords: Poisson

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

55) The makers of Crustfree Bread in Boston have a quality standard that allows for no more than 3 burned loaves per batch on average. Assuming that the average of 3 per batch is being met, the standard deviation for the number of burned loaves in 4 batches is approximately 1.73 loaves.

Answer: FALSE

Diff: 2

Keywords: standard deviation, Poisson

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

56) The primary application for the hypergeometric probability distribution is in situations where the sampling is done without replacement from a finite population.

Answer: TRUE

Diff: 1

Keywords: hypergeometric, sampling, replacement

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

57) A warehouse contains 5 parts made by the Stafford Company and 8 parts made by the Wilson Company. If an employee selects 3 of the parts from the warehouse at random, the probability that none of the 3 parts is from the Wilson Company is approximately .03496.

Answer: TRUE

Diff: 2

Keywords: hypergeometric, sample

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

58) A warehouse contains 5 parts made by the Stafford Company and 8 parts made by the Wilson Company. If an employee selects 3 of the parts from the warehouse at random, the probability that all 3 parts are from the Wilson Company is approximately .1958.

Answer: TRUE

Diff: 2

Keywords: hypergeometric, sample

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

59) The city council consists of 3 Democrats, 5 Republicans and 3 independents. Subcommittees are supposed to be randomly assigned from the council. Suppose the 5-member planning and zoning subcommittee is composed of 3 Democrats and 2 Republicans. The probability of this happening by chance alone is approximately .4545.

Answer: FALSE

Diff: 2

Keywords: hypergeometric, sample

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

60) A company has 20 cars that are available for use by company executives for official business purposes. Six of these cars are SUVs, 8 are luxury type cars, and the rest are basic sedans. Suppose the cars are randomly assigned each week. If 5 cars are put into use, the chance that none of the SUVs or luxury cars will be in the group is approximately .0004.

Answer: TRUE

Diff: 2

Keywords: hypergeometric sample

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

61) When dealing with the number of occurrences of an event over a specified interval of time or space, the appropriate probability distribution is hypergeometric.

Answer: FALSE

Diff: 2

Keywords: Poisson, hypergeometric

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

62) The following probability distribution has been assessed for the number of accidents that occur in a Midwestern city each day:

Accidents	Probability
0	0.25
1	0.20
2	0.30
3	0.15
4	0.10

The probability of having less than 2 accidents on a given day is:

A) 0.30

B) 0.75

C) 0.45

D) 0.25

Answer: C

Diff: 1

Keywords: discrete, random variable

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

63) The following probability distribution has been assessed for the number of accidents that occur in a Midwestern city each day:

Accidents	Probability
0	0.25
1	0.20
2	0.30
3	0.15
4	0.10

This distribution is an example of:

- A) a uniform distribution.
- B) a continuous probability distribution.
- C) a discrete probability distribution.
- D) an expected value distribution.

Answer: C

Diff: 1

Keywords: discrete, probability distribution

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

64) The following probability distribution has been assessed for the number of accidents that occur in a Midwestern city each day:

Accidents	Probability
0	0.25
1	0.20
2	0.30
3	0.15
4	0.10

Based on this distribution, the expected number of accidents in a given day is:

- A) 0.30
- B) 1.65
- C) 2.00
- D) 2.50

Answer: B

Diff: 2

Keywords: expected value, discrete distribution

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

65) The following probability distribution has been assessed for the number of accidents that occur in a Midwestern city each day:

Accidents	Probability
0	0.25
1	0.20
2	0.30
3	0.15
4	0.10

Based on this probability distribution, the standard deviation in the number of accidents per day is:

- A) 2.0
- B) 1.63
- C) 2.65
- D) 1.28

Answer: D

Diff: 2

Keywords: standard deviation, discrete distribution

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

66) A sales rep for a national clothing company makes 4 calls per day. Based on historical records, the following probability distribution describes the number of successful calls each day:

Successful Calls	Probability
0	0.10
1	0.30
2	0.30
3	0.20
4	0.10

Based on this information, the probability that the sales rep will have a total of 2 successful calls in a two-day period is:

- A) 0.60
- B) 0.09
- C) 0.15
- D) 0.06

Answer: C

Diff: 3

Keywords: discrete, probability

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

67) A sales rep for a national clothing company makes 4 calls per day. Based on historical records, the following probability distribution describes the number of successful calls each day:

Successful Calls	Probability
0	0.10
1	0.30
2	0.30
3	0.20
4	0.10

The expected number of successful sales calls per day is:

- A) 2.00
- B) 1.15
- C) 1.90
- D) 2.50

Answer: C

Diff: 2

Keywords: expected value, discrete distribution

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

68) A sales rep for a national clothing company makes 4 calls per day. Based on historical records, the following probability distribution describes the number of successful calls each day:

Successful Calls	Probability
0	0.10
1	0.30
2	0.30
3	0.20
4	0.10

Based on the information provided, what is the probability of having at least 2 successful calls in one day?

- A) 0.60
- B) 0.20
- C) 0.30
- D) 0.10

Answer: A

Diff: 1

Keywords: discrete distribution

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

69) Consider the following two probability distributions:

Distribution A		Distribution B	
x	P(x)	x	P(x)
0	0.20	0	0.01
1	0.20	1	0.02
2	0.20	2	0.94
3	0.20	3	0.02
4	0.20	4	0.01

Which of the following is an accurate statement regarding these two distributions?

- A) Distribution A has a higher variance.
- B) Distribution B has a higher variance.
- C) Both distributions are positively skewed.
- D) Both distributions are uniform.

Answer: A

Diff: 2

Keywords: discrete distribution, variance

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

70) Which of the following statements is incorrect?

- A) The expected value of a discrete probability distribution is the long-run average value assuming the experiment will be repeated many times.
- B) The standard deviation of a discrete probability distribution measures the average deviation of the random variable from the mean.
- C) The distribution is considered uniform if all the probabilities are equal.
- D) The mean of the probability distribution is equal to the square root of the variance.

Answer: D

Diff: 2

Keywords: probability distribution, expected value

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

71) The probability function for random variable X is specified as:

$$f(X) = X/6 \quad \text{for } X = 1, 2 \text{ or } 3$$

The expected value of X is

- A) 0.333
- B) 0.500
- C) 2.000
- D) 2.333

Answer: D

Diff: 2

Keywords: probability distribution, expected value

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

72) Which of the following is not a condition of the binomial distribution?

- A) Two possible outcomes for each trial
- B) The trials are independent.
- C) The standard deviation is equal to the square root of the mean.
- D) The probability of a success remains constant from trial to trial.

Answer: C

Diff: 1

Keywords: binomial distribution, standard deviation

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

73) A package delivery service claims that no more than 5 percent of all packages arrive at the address late. Assuming that the conditions for the binomial hold, if a sample of size 10 packages is randomly selected, and the 5 percent rate holds, what is the probability that exactly 2 packages in the sample arrive late?

- A) 0.0746
- B) 0.9884
- C) 0.2347
- D) 0.0439

Answer: A

Diff: 2

Keywords: binomial distribution, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

74) A package delivery service claims that no more than 5 percent of all packages arrive at the address late. Assuming that the conditions for the binomial hold, if a sample of size 10 packages is randomly selected and the 5 percent rate holds, what is the probability that more than 2 packages will be delivered late?

- A) 0.0115
- B) 0.0105
- C) 0.0862
- D) 0.0746

Answer: A

Diff: 2

Keywords: binomial distribution, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

75) The Vardon Exploration Company is getting ready to leave for South America to explore for oil. One piece of equipment requires 10 batteries that must operate for more than 2 hours. The batteries being used have a 15 percent chance of failing within 2 hours. The exploration leader plans to take 15 batteries. Assuming that the conditions of the binomial apply, the probability that the supply of batteries will contain enough good ones to operate the equipment is:

- A) 0.0449
- B) 0.9832
- C) 0.0132
- D) 0.9964

Answer: B

Diff: 3

Keywords: binomial distribution, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

76) The Vardon Exploration Company is getting ready to leave for South America to explore for oil. One piece of equipment requires 10 batteries that must operate for more than 2 hours. The batteries being used have a 15 percent chance of failing within 2 hours. The exploration leader plans to take 15 batteries. Assuming that the conditions of the binomial apply, the probability that the supply of batteries will not contain enough good ones to operate the equipment is:

- A) 0.0449
- B) 0.0132
- C) 0.9832
- D) 0.0168

Answer: D

Diff: 3

Keywords: binomial distribution, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

77) Previous research shows that 60 percent of adults who drink non-diet cola prefer Coca-Cola to Pepsi. Recently, an independent research firm questioned a random sample of 25 adult non-diet cola drinkers. That chance that 20 or more of these people will prefer Coca-Cola is:

- A) essentially zero.
- B) 0.0199.
- C) 0.0294.
- D) None of the above

Answer: C

Diff: 2

Keywords: binomial, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

78) Many people believe that they can tell the difference between Coke and Pepsi. Other people say that the two brands can't be distinguished. To test this, a random sample of 20 adults was selected to participate in a test. After being blindfolded, each person was given a small taste of either Coke or Pepsi and asked to indicate which brand soft drink it was. If people really can't tell the difference, the expected number of correct identifications in the sample would be:

- A) 10.
- B) 0.
- C) between 4 and 9.
- D) Can't be determined without more information.

Answer: A

Diff: 2

Keywords: binomial, expected value

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

79) Many people believe that they can tell the difference between Coke and Pepsi. Other people say that the two brands can't be distinguished. To test this, a random sample of 20 adults was selected to participate in a test. After being blindfolded, each person was given a small taste of either Coke or Pepsi and asked to indicate which brand soft drink it was. If people really can't tell the difference, the probability that fewer than 6 people will guess correctly is:

- A) 0.0148
- B) approximately 0.02
- C) 0.0307
- D) 0.0514

Answer: B

Diff: 2

Keywords: binomial, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

80) Many people believe that they can tell the difference between Coke and Pepsi. Other people say that the two brands can't be distinguished. To test this, a random sample of 20 adults was selected to participate in a test. After being blindfolded, each person was given a small taste of either Coke or Pepsi and asked to indicate which brand soft drink it was. Suppose 14 people correctly identified the soft drink brand. Which of the following conclusions would be warranted under the circumstance?

- A) Since the chance of getting 14 correct is 0.0370, which is quite small, the study shows that people are not able to identify brands effectively.
- B) Since the probability of getting 14 or more correct is 0.0577, which is quite low, this means that people are not effective in identifying the soft drink brand.
- C) Since the probability of getting 14 or more correct is 0.0577, which is quite low, the conclusion could be that people are effective at identifying soft drink brands.
- D) The expected value for this binomial distribution is very close to 14 so this supports that people cannot tell the difference.

Answer: C

Diff: 3

Keywords: binomial, expected value, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

81) Madam Helga claims to be psychic. A national TV talk personality plans to test her in a live TV broadcast. The process will entail asking Madam Helga a series of 20 independent questions with yes/no answers. The questions would be of the nature that she could not have any way of knowing the answer from prior knowledge. She will be considered psychic if she correctly answers more than a specified number (called the cut-off) of the questions. The cut-off must be set so that the chance of guessing that number or more is no greater than 5 percent. The cut-off value should be:

- A) 12
- B) 14
- C) 10
- D) Can't be determined without more information.

Answer: B

Diff: 3

Keywords: binomial, probability, expected value

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

82) Madam Helga claims to be psychic. A national TV talk personality plans to test her in a live TV broadcast. The process will entail asking Madam Helga a series of 20 independent questions with yes/no answers. The questions would be of the nature that she could not have any way of knowing the answer from prior knowledge. Suppose that Madam Helga correctly answered 15 of the 20 questions, which of the following would be a viable conclusion to reach?

- A) Because the probability of guessing 15 or more correctly is 0.0207, it is unlikely that she is guessing at the questions and may, in fact, have some special ability.
- B) Because the probability of getting 15 or more correct is 0.0207, it is likely that she is just guessing at the questions.
- C) If she were guessing, 15 is within one standard deviation of the mean and therefore she must not have any special psychic abilities.
- D) Because the probability of guessing exactly 15 correct is 0.0148, she must just be guessing.

Answer: A

Diff: 3

Keywords: binomial, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

83) Which of the following is true with respect to the binomial distribution?

- A) As the sample size increases, the expected value of the random variable decreases.
- B) The binomial distribution becomes more skewed as the sample size is increased for a given probability of success.
- C) The binomial distribution tends to be more symmetric as p approaches 0.5.
- D) In order for the binomial distribution to be skewed, the sample size must be quite large.

Answer: C

Diff: 2

Keywords: binomial, symmetric

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

84) Which of the following statements is true?

- A) A binomial distribution with $n = 20$ and $p = 0.05$ will be right-skewed.
- B) A binomial distribution with $n = 6$ and $p = 0.50$ will be symmetric.
- C) A binomial distribution with $n = 20$ and $p = 0.05$ has an expected value equal to 1.
- D) A, B, and C are all true.

Answer: D

Diff: 2

Keywords: binomial, symmetric, expected value

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

85) If the number of defective items selected at random from a parts inventory is considered to follow a binomial distribution with $n = 50$ and $p = 0.10$, the expected number of defective parts is:

- A) 5
- B) approximately 2.24
- C) more than 10
- D) 0.5

Answer: A

Diff: 1

Keywords: binomial, expected value

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

86) If the number of defective items selected at random from a parts inventory is considered to follow a binomial distribution with $n = 50$ and $p = 0.10$, the standard deviation of the number of defective parts is:

- A) 5
- B) 4.5
- C) 45
- D) about 2.12

Answer: D

Diff: 2

Keywords: binomial, standard deviation

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

87) The probability that a product is found to be defective is 0.10. If we examine 50 products, which of the following has the highest probability?

- A) 3 defective products are found.
- B) 4 defective products are found.
- C) 5 defective products are found.
- D) 6 defective products are found.

Answer: C

Diff: 2

Keywords: binomial, expected value

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

88) If a study is set up in such a way that a sample of people is surveyed to determine whether they have ever used a particular product, the likely probability distribution that would describe the random variable, the number who say yes, is a:

- A) binomial distribution.
- B) Poisson distribution.
- C) uniform distribution.
- D) continuous distribution.

Answer: A

Diff: 2

Keywords: binomial, distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

89) Assuming that potholes occur randomly along roads, the number of potholes per mile of road could best be described by the:

- A) binomial distribution.
- B) Poisson distribution.
- C) hypergeometric distribution.
- D) continuous distribution

Answer: B

Diff: 2

Keywords: Poisson distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

90) The number of visible defects on a product container is thought to be Poisson distributed with a mean equal to 3.5. Based on this, the probability that 2 containers will contain a total of less than 2 defects is:

- A) 0.0223
- B) 0.1359
- C) 0.0073
- D) 0.1850

Answer: C

Diff: 2

Keywords: Poisson distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

91) The number of visible defects on a product container is thought to be Poisson distributed with a mean equal to 3.5. Based on this, how many defects should be expected if 3 containers are inspected?

- A) 10.5
- B) Approximately 3.24
- C) Between 4 and 7
- D) 3.5

Answer: A

Diff: 1

Keywords: Poisson, expected value

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

92) The number of customers who enter a bank is thought to be Poisson distributed with a mean equal to 10 per hour. What are the chances that no customers will arrive in a 15-minute period?

- A) Approximately zero
- B) 0.0067
- C) 0.0821
- D) 0.0250

Answer: C

Diff: 2

Keywords: Poisson, expected value

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

93) The number of customers who enter a bank is thought to be Poisson distributed with a mean equal to 10 per hour. What are the chances that 2 or 3 customers will arrive in a 15-minute period?

- A) 0.0099
- B) 0.4703
- C) 0.0427
- D) 0.0053

Answer: B

Diff: 2

Keywords: Poisson, probability

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

94) If cars arrive to a service center randomly and independently at a rate of 5 per hour on average, what is the probability of 0 cars arriving in a given hour?

- A) 0.1755
- B) 0.0067
- C) 0.0000
- D) 0.0500

Answer: B

Diff: 2

Keywords: Poisson, probability

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

95) If cars arrive to a service center randomly and independently at a rate of 5 per hour on average, what is the probability that exactly 5 cars will arrive during a given hour?

- A) 0.1755
- B) 0.6160
- C) 0.1277
- D) Essentially zero

Answer: A

Diff: 2

Keywords: Poisson, probability

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

96) The number of weeds that remain living after a specific chemical has been applied averages 1.3 per square yard and follows a Poisson distribution. Based on this, what is the probability that a 1-square yard section will contain less than 4 weeds?

- A) 0.0324
- B) 0.0998
- C) Nearly 0.5000
- D) 0.9569

Answer: D

Diff: 2

Keywords: Poisson, probability

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

97) The number of weeds that remain living after a specific chemical has been applied averages 1.3 per square yard and follows a Poisson distribution. Based on this, what is the probability that a 3-square yard section will contain less than 4 weeds?

- A) 0.4532
- B) 0.2001
- C) 0.6482
- D) 0.1951

Answer: A

Diff: 2

Keywords: Poisson, probability

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

98) Which of the following statements is true with respect to a Poisson distribution?

- A) The Poisson distribution is symmetrical when the mean is close to 5.
- B) The Poisson distribution is more right-skewed for smaller values of the mean.
- C) The variance of the Poisson distribution is equal to the square root of the expected value.
- D) The Poisson distribution is an example of a continuous probability distribution.

Answer: B

Diff: 2

Keywords: Poisson, skewed

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

99) The manager of a movie theater has determined that the distribution of customers arriving at the concession stand is Poisson distributed with a standard deviation equal to 2 people per 10 minutes. What is the probability that more than 3 customers arrive during a 10-minute period?

- A) 0.1804
- B) 0.5665
- C) 0.4335
- D) 0.1954

Answer: B

Diff: 3

Keywords: Poisson, probability

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

100) The manager of a movie theater has determined that the distribution of customers arriving at the concession stand is Poisson distributed with a standard deviation equal to 2 people per 10 minutes. What is the probability that 0 customers arrive during a 10-minute period?

- A) 0.1353
- B) 0.0183
- C) 0.9817
- D) Essentially 0

Answer: B

Diff: 2

Keywords: Poisson, probability

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

101) If the standard deviation for a Poisson distribution is known to be 3, the expected value of that Poisson distribution is:

- A) 3
- B) about 1.73
- C) 9
- D) Can't be determined without more information.

Answer: C

Diff: 2

Keywords: Poisson, expected value, mean, standard deviation

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

102) If a distribution is considered to be Poisson with a mean equal to 11, the most frequently occurring value for the random variable will be:

- A) 10.5
- B) 11
- C) 10 and 11
- D) 22

Answer: C

Diff: 2

Keywords: Poisson, mean, distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

103) The hypergeometric probability distribution is used rather than the binomial or the Poisson when:

- A) the sampling is performed with replacement.
- B) the sampling is performed without replacement from an infinite population.
- C) the sampling is performed without replacement from a finite population.
- D) the sampling is performed with replacement from a finite population.

Answer: C

Diff: 2

Keywords: hypergeometric, sampling, replacement

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

104) A small city has two taxi companies (A and B). Each taxi company has 5 taxis. A motel has told these companies that they will randomly select a taxi company when one of its customers needs a cab. This morning 3 cabs were needed. Assuming that no one individual taxi can be used more than once, what is the probability that 2 of the cabs selected will be from Company A and the other will be from B?

- A) 0.417
- B) 0.25
- C) 0.583
- D) 0.5

Answer: A

Diff: 2

Keywords: hypergeometric, probability

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

105) A local paint store carries 4 brands of paint (W, X, Y, and Z). The store has 5 cans of W, 3 cans of X, 6 cans of Y, and 15 cans of Z, all in white. It is thought that customers have no preference for one of these brands over another. If this is the case, what is the probability that the next 5 customers will select 1 can of W, X, Y and 2 cans of brand Z?

- A) About .23
- B) Approximately .08
- C) Over .30
- D) 0.25

Answer: B

Diff: 3

Keywords: hypergeometric, probability

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

106) The random variable x is the number of customers arriving at the service desk of a local car dealership over an interval of 10 minutes. It is known that the average number of arrivals in 10 minutes is 5.3. The probability that there are less than 3 arrivals in any 10 minutes is:

- A) .0659
- B) .0948
- C) .1016
- D) .1239

Answer: C

Diff: 2

Keywords: Poisson, distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

107) Because of bad weather, the number of days next week that the captain of a charter fishing boat can leave port is uncertain. Let x = number of days that the boat is able to leave port per week. The following probability distribution for the variable, x , was determined based on historical data when the weather was poor:

x	$P(x)$
0	0.05
1	0.10
2	0.10
3	0.20
4	0.20
5	0.15
6	0.15
7	0.05

Based on the probability distribution, what is the expected number of days per week the captain can leave port?

- A) 3.7
- B) 4.5
- C) 2.8
- D) 1.7

Answer: A

Diff: 1

Keywords: discrete, probability distribution

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

108) The roll of a pair of dice has the following probability distribution, where the random variable is the sum of the values produced by each die:

x	$P(x)$
2	$1/36$
3	$2/36$
4	$3/36$
5	$4/36$
6	$5/36$
7	$6/36$
8	$5/36$
9	$4/36$
10	$3/36$
11	$2/36$
12	$1/36$

Calculate the expected value of x .

- A) 6
- B) 7
- C) 8
- D) 9

Answer: B

Diff: 2

Keywords: discrete, probability distribution

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

109) The roll of a pair of dice has the following probability distribution, where the random variable x is the sum of the values produced by each die:

x	$P(x)$
2	$1/36$
3	$2/36$
4	$3/36$
5	$4/36$
6	$5/36$
7	$6/36$
8	$5/36$
9	$4/36$
10	$3/36$
11	$2/36$
12	$1/36$

Calculate the variance of x .

A) 5.833

B) 6.122

C) 5.666

D) 5.122

Answer: A

Diff: 2

Keywords: discrete, probability distribution

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

110) The roll of a pair of dice has the following probability distribution, where the random variable is the sum of the values produced by each die:

x	$P(x)$
2	$1/36$
3	$2/36$
4	$3/36$
5	$4/36$
6	$5/36$
7	$6/36$
8	$5/36$
9	$4/36$
10	$3/36$
11	$2/36$
12	$1/36$

Calculate the standard deviation of x .

A) 3.415

B) 2.333

C) 3.125

D) 2.415

Answer: D

Diff: 2

Keywords: discrete, probability distribution

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

111) The U.S. Census Bureau (Annual Social & Economic Supplement) collects demographics concerning the number of people in families per household. Assume the distribution of the number of people per household is shown in the following table:

x	$P(x)$
2	0.27
3	0.25
4	0.28
5	0.13
6	0.04
7	0.03

Calculate the expected number of people in families per household in the United States.

- A) 2.71
- B) 3.33
- C) 3.51
- D) 4.33

Answer: C

Diff: 2

Keywords: discrete, probability distribution

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

112) The U.S. Census Bureau (Annual Social & Economic Supplement) collects demographics concerning the number of people in families per household. Assume the distribution of the number of people per household is shown in the following table:

x	$P(x)$
2	0.27
3	0.25
4	0.28
5	0.13
6	0.04
7	0.03

Compute the variance and standard deviation of the number of people in families per household.

- A) Variance=1.6499, standard deviation=1.2845
- B) Variance=1.2845, standard deviation=1.6499
- C) Variance=6.7182, standard deviation=2.5919
- D) Variance=2.5919, standard deviation=6.7182

Answer: A

Diff: 2

Keywords: discrete, probability distribution

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

113) Jennings Assembly in Hartford, Connecticut, uses a component supplied by a company in Brazil. The component is expensive to carry in inventory and consequently is not always available in stock when requested. Furthermore, shipping schedules are such that the lead time for transportation of the component is not a constant. Using historical records, the manufacturing firm has developed the following probability distribution for the product's lead time. The distribution is shown here, where the random variable is the number of days between the placement of the replenishment order and the receipt of the item.

x	$P(x)$
2	0.15
3	0.45
4	0.30
5	0.075
6	0.025

What is the average lead time for the component?

- A) 2.375
- B) 2.875
- C) 3.275
- D) 3.375

Answer: D

Diff: 2

Keywords: discrete, probability distribution

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

114) Jennings Assembly in Hartford, Connecticut, uses a component supplied by a company in Brazil. The component is expensive to carry in inventory and consequently is not always available in stock when requested. Furthermore, shipping schedules are such that the lead time for transportation of the component is not a constant. Using historical records, the manufacturing firm has developed the following probability distribution for the product's lead time. The distribution is shown here, where the random variable is the number of days between the placement of the replenishment order and the receipt of the item.

x	$P(x)$
2	0.15
3	0.45
4	0.30
5	0.075
6	0.025

What is the coefficient of variation for delivery lead time?

- A) 38.461%
- B) 27.065%
- C) 27.891%
- D) 31.772%

Answer: B

Diff: 2

Keywords: discrete, probability distribution

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

115) Cramer's Bar and Grille in Dallas can seat 130 people at a time. The manager has been gathering data on the number of minutes a party of four spends in the restaurant from the moment they are seated to when they pay the check.

Number of Minutes	Probability
60	0.05
70	0.15
80	0.20
90	0.45
100	0.10
110	0.05

What is the mean number of minutes for a dinner party of four?

- A) 65.5
- B) 67.5
- C) 85.5
- D) 75.5

Answer: C

Diff: 2

Keywords: discrete, probability distribution

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

116) Cramer's Bar and Grille in Dallas can seat 130 people at a time. The manager has been gathering data on the number of minutes a party of four spends in the restaurant from the moment they are seated to when they pay the check.

Number of Minutes	Probability
60	0.05
70	0.15
80	0.20
90	0.45
100	0.10
110	0.05

What is the variance and standard deviation?

- A) Variance = 164.99, standard deviation = 12.84
- B) Variance = 233.75, standard deviation = 15.89
- C) Variance = 128.75, standard deviation = 11.35
- D) Variance = 134.75, standard deviation = 11.61

Answer: D

Diff: 2

Keywords: discrete, probability distribution

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

117) The manager for State Bank and Trust has recently examined the credit card account balances for the customers of her bank and found that 20% have an outstanding balance at the credit card limit. Suppose the manager randomly selects 15 customers and finds 4 that have balances at the limit. Assume that the properties of the binomial distribution apply.

What is the probability of finding 4 customers in a sample of 15 who have "maxed out" their credit cards?

- A) 0.1876
- B) 0.8358
- C) 0.6482
- D) 0.3832

Answer: A

Diff: 2

Keywords: binomial distribution, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 1

118) The manager for State Bank and Trust has recently examined the credit card account balances for the customers of her bank and found that 20% have an outstanding balance at the credit card limit. Suppose the manager randomly selects 15 customers and finds 4 that have balances at the limit. Assume that the properties of the binomial distribution apply.

What is the probability that 4 or fewer customers in the sample will have balances at the limit of the credit card?

- A) 0.1876
- B) 0.8358
- C) 0.6482
- D) 0.3832

Answer: B

Diff: 2

Keywords: binomial distribution, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 1

119) For a binomial distribution with a sample size equal to 10 and a probability of a success equal to 0.30, what is the probability that the sample will contain exactly three successes? Use the binomial formula to determine the probability.

- A) 0.3277
- B) 0.3288
- C) 0.2668
- D) 0.2577

Answer: C

Diff: 2

Keywords: binomial distribution, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 1

120) If a binomial distribution applies with a sample size of $n = 20$, find the probability of 5 successes if the probability of a success is 0.40.

- A) 0.1246
- B) 0.1286
- C) 0.0746
- D) 0.0866

Answer: C

Diff: 2

Keywords: binomial distribution, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 1

121) If a binomial distribution applies with a sample size of $n = 20$, find the probability of at least 7 successes if the probability of a success is 0.25.

- A) 0.1814
- B) 0.2142
- C) 0.2333
- D) 0.3123

Answer: B

Diff: 2

Keywords: binomial distribution, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 1

122) If a binomial distribution applies with a sample size of $n = 20$, find the expected value, $n = 20$, $p = 0.20$.

- A) 2
- B) 3
- C) 4
- D) 5

Answer: C

Diff: 2

Keywords: binomial distribution, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 1

123) If a binomial distribution applies with a sample size of $n = 20$, find the standard deviation, $n = 20$, $p = 0.20$.

- A) 1.7889
- B) 2.1889
- C) 2.7889
- D) 3.1221

Answer: A

Diff: 2

Keywords: binomial distribution, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 1

124) Given a binomial distribution with $n = 8$ and $p = 0.40$, obtain the mean.

- A) 2.8
- B) 3.2
- C) 3.6
- D) 4.2

Answer: B

Diff: 1

Keywords: binomial distribution, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 1

125) Given a binomial distribution with $n = 8$ and $p = 0.40$, obtain the standard deviation.

- A) 1.921
- B) 1.386
- C) 1.848
- D) 1.465

Answer: B

Diff: 2

Keywords: binomial distribution, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 1

126) Given a binomial distribution with $n = 8$ and $p = 0.40$, obtain the probability that the number of successes is larger than the mean.

- A) 0.4059
- B) 0.3882
- C) 0.2582
- D) 0.6070

Answer: A

Diff: 2

Keywords: binomial distribution, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 1

127) Given a binomial distribution with $n = 8$ and $p = 0.40$, obtain the probability that the number of successes is within 2 standard deviations of the mean.

- A) 0.6887
- B) 0.7334
- C) 0.8665
- D) 0.9334

Answer: D

Diff: 2

Keywords: binomial distribution, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 1

128) Magic Valley Memorial Hospital administrators have recently received an internal audit report that indicates that 15% of all patient bills contain an error of one form or another. After spending considerable effort to improve the hospital's billing process, the administrators are convinced that things have improved. They believe that the new error rate is somewhere closer to 0.05. Suppose that recently the hospital randomly sampled 10 patient bills and conducted a thorough study to determine whether an error exists. It found 3 bills with errors. Assuming that managers are correct that they have improved the error rate to 0.05, what is the probability that they would find 3 or more errors in a sample of 10 bills?

- A) 0.0115
- B) 0.0233
- C) 0.0884
- D) 0.0766

Answer: A

Diff: 2

Keywords: binomial distribution, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 1

129) Dell Computers receives large shipments of microprocessors from Intel Corp. It must try to ensure the proportion of microprocessors that are defective is small. Suppose Dell decides to test five microprocessors out of a shipment of thousands of these microprocessors. Suppose that if at least one of the microprocessors is defective, the shipment is returned.

If Intel Corp.'s shipment contains 10% defective microprocessors, calculate the probability the entire shipment will be returned.

- A) 0.4980
- B) 0.4209
- C) 0.4095
- D) 0.4550

Answer: C

Diff: 2

Keywords: binomial distribution, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 1

130) Dell Computers receives large shipments of microprocessors from Intel Corp. It must try to ensure the proportion of microprocessors that are defective is small. Suppose Dell decides to test five microprocessors out of a shipment of thousands of these microprocessors. Suppose that if at least one of the microprocessors is defective, the shipment is returned.

If Intel and Dell agree that Intel will not provide more than 5% defective chips, calculate the probability that the entire shipment will be returned even though only 5% are defective.

- A) 0.2262
- B) 0.3478
- C) 0.4564
- D) 0.1812

Answer: A

Diff: 2

Keywords: binomial distribution, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 1

131) Dell Computers receives large shipments of microprocessors from Intel Corp. It must try to ensure the proportion of microprocessors that are defective is small. Suppose Dell decides to test five microprocessors out of a shipment of thousands of these microprocessors. Suppose that if at least one of the microprocessors is defective, the shipment is returned.

Calculate the probability that the entire shipment will be kept by Dell even though the shipment has 10% defective microprocessors.

- A) 0.3995
- B) 0.3979
- C) 0.5905
- D) 0.4550

Answer: C

Diff: 2

Keywords: binomial distribution, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 1

132) The mean number of errors per page made by a member of the word processing pool for a large company is thought to be 1.5 with the number of errors distributed according to a Poisson distribution. If three pages are examined, what is the probability that more than 3 errors will be observed?

- A) 0.6577
- B) 0.6969
- C) 0.7324
- D) 0.7860

Answer: A

Diff: 2

Keywords: discrete, probability distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 1

133) Arrivals to a bank automated teller machine (ATM) are distributed according to a Poisson distribution with a mean equal to three per 15 minutes. Determine the probability that in a given 15-minute segment no customers will arrive at the ATM.

- A) 0.0124
- B) 0.0281
- C) 0.0314
- D) 0.0498

Answer: D

Diff: 2

Keywords: discrete, probability distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 1

134) Arrivals to a bank automated teller machine (ATM) are distributed according to a Poisson distribution with a mean equal to three per 15 minutes.

What is the probability that fewer than four customers will arrive in a 30-minute segment?

A) 0.1512

B) 0.1889

C) 0.2515

D) 0.2576

Answer: A

Diff: 2

Keywords: discrete, probability distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 1

135) Consider a situation in which a used-car lot contains five Fords, four General Motors (GM) cars, and five Toyotas. If five cars are selected at random to be placed on a special sale, what is the probability that three are Fords and two are GMs?

A) 0.09

B) 0.03

C) 0.04

D) 0.06

Answer: B

Diff: 3

Keywords: discrete, probability distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 1

136) A population of 10 items contains 3 that are red and 7 that are green. What is the probability that in a random sample of 3 items selected without replacement, 2 red and 1 green items are selected?

A) 0.175

B) 0.086

C) 0.124

D) 0.211

Answer: A

Diff: 3

Keywords: discrete, probability distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 1

137) A corporation has 11 manufacturing plants. Of these, 7 are domestic and 4 are located outside the United States. Each year a performance evaluation is conducted for 4 randomly selected plants. What is the probability that a performance evaluation will include exactly 1 plant outside the United States?

A) 0.4242

B) 0.3776

C) 0.3523

D) 0.4696

Answer: A

Diff: 3

Keywords: discrete, probability distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 1

138) A corporation has 11 manufacturing plants. Of these, 7 are domestic and 4 are located outside the United States. Each year a performance evaluation is conducted for 4 randomly selected plants.

What is the probability that a performance evaluation will contain 3 plants from the United States?

A) 0.4242

B) 0.3776

C) 0.3523

D) 0.4696

Answer: A

Diff: 3

Keywords: discrete, probability distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 1

139) A corporation has 11 manufacturing plants. Of these, 7 are domestic and 4 are located outside the United States. Each year a performance evaluation is conducted for 4 randomly selected plants.

What is the probability that a performance evaluation will include 2 or more plants from outside the United States?

A) 0.4242

B) 0.3776

C) 0.3523

D) 0.4696

Answer: D

Diff: 3

Keywords: discrete, probability distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 1

140) A new phone answering system installed by the Ohio Power Company is capable of handling five calls every 10 minutes. Prior to installing the new system, company analysts determined that the incoming calls to the system are Poisson distributed with a mean equal to two every 10 minutes. If this incoming call distribution is what the analysts think it is, what is the probability that in a 10-minute period more calls will arrive than the system can handle?

- A) 0.174
- B) 0.0812
- C) 0.0166
- D) 0.0233

Answer: C

Diff: 3

Keywords: discrete, probability distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 1

141) The Weyerhaeuser Lumber Company headquartered in Tacoma, Washington, is one of the largest timber and wood product companies in the world. Weyerhaeuser manufactures plywood at one of its Oregon plants. Plywood contains minor imperfections that can be repaired with small "plugs." One customer will accept plywood with a maximum of 3.5 plugs per sheet on average. Suppose a shipment was sent to this customer and when the customer inspected two sheets at random, 10 plugged defects were counted. What is the probability of observing 10 or more plugged defects if in fact the 3.5 average per sheet is being satisfied?

- A) 0.1887
- B) 0.1695
- C) 0.2115
- D) 0.2675

Answer: B

Diff: 3

Keywords: discrete, probability distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 1

142) A stock portfolio contains 20 stocks. Of these stocks, 10 are considered "large-cap" stocks, 5 are "mid-cap," and 5 are "small cap." The portfolio manager has been asked by his client to develop a report that highlights 7 randomly selected stocks. When she presents her report to the client, all 7 of the stocks are large-cap stocks. The client is very suspicious that the manager has not randomly selected the stocks. She believes that the chances of all 7 of the stocks being large cap must be very low. Compute the probability of all 7 being large cap.

- A) 0.0015
- B) 0.0008
- C) 0.0121
- D) 0.0309

Answer: A

Diff: 3

Keywords: discrete, probability distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 1

143) College-Pro Painting does home interior and exterior painting. The company uses inexperienced painters that do not always do a high-quality job. It believes that its painting process can be described by a Poisson distribution with an average of 4.8 defects per 400 square feet of painting.

What is the probability that a 400-square-foot painted section will have fewer than 6 blemishes?

A) 0.2818

B) 0.3414

C) 0.4857

D) 0.6510

Answer: D

Diff: 3

Keywords: discrete, probability distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 1

144) College-Pro Painting does home interior and exterior painting. The company uses inexperienced painters that do not always do a high-quality job. It believes that its painting process can be described by a Poisson distribution with an average of 4.8 defects per 400 square feet of painting.

What is the probability that six randomly sampled sections of size 400 square feet will each have 7 or fewer blemishes?

A) 0.2818

B) 0.3414

C) 0.4857

D) 0.6509

Answer: C

Diff: 3

Keywords: discrete, probability distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 1

145) John Thurgood founded a company that translates Chinese books into English. His company is currently testing a computer-based translation service. Since Chinese symbols are difficult to translate, John assumes the computer program will make some errors, but then so do human translators. The computer error rate is supposed to be an average of 3 per 400 words of translation. Suppose John randomly selects a 1,200-word passage. Assuming that the Poisson distribution applies, if the computer error rate is actually 3 errors per 400 words, determine the probability that no errors will be found.

A) 0.0001

B) 0.0141

C) 0.0415

D) 0.4557

Answer: A

Diff: 3

Keywords: discrete, probability distribution

Section: 5-3 Other Discrete Probability Distributions/Thompson_sn3t_WordExports

Outcome: 1

146) John Thurgood founded a company that translates Chinese books into English. His company is currently testing a computer-based translation service. Since Chinese symbols are difficult to translate, John assumes the computer program will make some errors, but then so do human translators. The computer error rate is supposed to be an average of 3 per 400 words of translation. Suppose John randomly selects a 1,200-word passage. Assuming that the Poisson distribution applies, if the computer error rate is actually 3 errors per 400 words, calculate the probability that more than 14 errors will be found.

- A) 0.000123
- B) 0.0141
- C) 0.0415
- D) 0.4557

Answer: C

Diff: 3

Keywords: discrete, probability distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 1

147) John Thurgood founded a company that translates Chinese books into English. His company is currently testing a computer-based translation service. Since Chinese symbols are difficult to translate, John assumes the computer program will make some errors, but then so do human translators. The computer error rate is supposed to be an average of 3 per 400 words of translation. Suppose John randomly selects a 1,200-word passage. Assuming that the Poisson distribution applies, if the computer error rate is actually 3 errors per 400 words, find the probability that fewer than 9 errors will be found.

- A) 0.000123
- B) 0.0141
- C) 0.0415
- D) 0.4557

Answer: D

Diff: 3

Keywords: discrete, probability distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 1

148) Beacon Hill Trees & Shrubs currently has an inventory of 10 fruit trees, 8 pine trees, and 14 maple trees. It plans to give 4 trees away at next Saturday's lawn and garden show in the city park. The 4 winners can select which type of tree they want. Assume they select randomly.

What is the probability that all 4 winners will select the same type of tree?

- A) 0.0058
- B) 0.0218
- C) 0.0355
- D) 0.0709

Answer: C

Diff: 3

Keywords: discrete, probability distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 1

149) Beacon Hill Trees & Shrubs currently has an inventory of 10 fruit trees, 8 pine trees, and 14 maple trees. It plans to give 4 trees away at next Saturday's lawn and garden show in the city park. The 4 winners can select which type of tree they want. Assume they select randomly.

What is the probability that 3 winners will select pine trees and the other tree will be a maple?

A) 0.0058

B) 0.0218

C) 0.0355

D) 0.0709

Answer: B

Diff: 3

Keywords: discrete, probability distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 1

150) Beacon Hill Trees & Shrubs currently has an inventory of 10 fruit trees, 8 pine trees, and 14 maple trees. It plans to give 4 trees away at next Saturday's lawn and garden show in the city park. The 4 winners can select which type of tree they want. Assume they select randomly.

What is the probability that no fruit trees and 2 of each of the others will be selected?

A) 0.0058

B) 0.0218

C) 0.0355

D) 0.0709

Answer: D

Diff: 3

Keywords: discrete, probability distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 1

151) What is the difference between a discrete random variable and a continuous random variable?

Answer: A discrete random variable is one that can assume only a countable number of values, while a continuous random variable can assume any value along a continuum and the possible values are uncountable.

Diff: 1

Keywords: discrete, continuous, random variable

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

152) Explain what the expected value of a discrete random variable measures.

Answer: The expected value is the weighted average of the possible values for the discrete random variable where the weights are the individual probabilities associated with each possible value. The expected value represents the long-run average value for the random variable if the experiment that generates the random variable is repeated a very large number of times.

Diff: 2

Keywords: expected value, discrete random variable

Section: 5-1 Introduction to Discrete Probability Distributions

Outcome: 1

153) Explain how to determine whether the binomial distribution can be used in a particular application.

Answer: First, the random variable of interest must be discrete. Then look to see whether there are a specified number of trials, of which there are only 2 possible outcomes, each of which is conducted in an identical manner. Then determine whether it is possible to count the number of successes and the number of failures that occur when the trials are performed. Finally, check to see if the probability of a success can be assumed to remain constant from trial to trial.

Diff: 2

Keywords: binomial distribution

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

154) A small city has 2 ambulances. Emergency calls for ambulances arrive randomly with an average of 0.2 calls per hour. They are concerned about the possibility of both ambulances being busy when an additional call comes in. What is the probability of more than 2 calls in a 1-hour period? Determine the correct distribution, explain why it is the best distribution to use, and find the probability.

Answer: This would be the Poisson distribution because it deals with the discrete number of calls arriving randomly over time. There is no particular upper bound as you would have in the binomial distribution because there are no yes/no type trials going on. Using the average of 0.2 we have

$$P(0) = 0.8187$$

$$P(1) = 0.1638 \quad \text{So } P(\# \text{ calls} \leq 2) = .9989$$

$$P(2) = 0.0164$$

This means $P(\# \text{ calls} > 2) = P(\# \text{ calls} \geq 3) = 1 - 0.9988 = 0.0012$.

So it would be a very rare event to receive more than 2 calls during a 1-hour period.

Diff: 2

Keywords: Poisson distribution, probability

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

155) Explain how to use the binomial distribution table when p , the probability of a success, exceeds 0.50.

Answer: When $p > 0.50$, you have two options. The first option is to think in terms of failures rather than successes—for instance, if the sample size is $n = 10$ and we originally want to find the probability of 3 successes when $p = 0.70$. Instead we can switch the problem around and instead of finding the probability of 3 successes, we can find the probability of 7 failures with the probability of a failure being $p = 0.30$. An alternative method is to use the q values at the bottom of each column (if the binomial distribution table being used has these values). Treat these as if they were the p values. Then locate the number of successes of interest in the right-hand column of the binomial table. Both methods will give the same result.

Diff: 3

Keywords: binomial distribution, probability

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

156) A company that makes chocolate chip cookies has found that the number of chips per cookie follows a Poisson distribution. What should the minimum average number of chips be to result in at least 98 percent of the cookies having more than 2 chips? Find the minimum average to nearest whole chip (i.e. choose an average that is a whole number).

Answer: Here the problem is to determine the minimum average number of chips per cookie that will result in at least 98 percent of the cookies having more than 2 chips. This means that at most 2 percent of the cookies have 2 chips or less.

Trying an average of 5 chips per cookie gives us:

$P(0 \text{ or } 1 \text{ or } 2) = .0067 + .0337 + .0842 = 0.1246$, which is much too large.

Trying an average of 6 chips per cookie gives us:

$P(0 \text{ or } 1 \text{ or } 2) = .0025 + .0149 + .0446 = 0.0620$, which is also too large.

Trying an average of 7 chips per cookie gives us:

$P(0 \text{ or } 1 \text{ or } 2) = .0009 + .0064 + .0223 = 0.0296$, which is getting close.

Trying an average of 8 chips per cookie gives us:

$P(0 \text{ or } 1 \text{ or } 2) = .0003 + .0027 + .0107 = 0.0137$, which is less than 2 percent.

Therefore it should use enough chips so that the average number of chips per cookie is 8, which will result in only 1.37 percent of the cookies having 2 chips or less, and 98.63 percent of the cookies having more than 2 chips.

Diff: 2

Keywords: Poisson distribution

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

157) The binomial distribution is frequently used to help companies decide whether to accept or reject a shipment based on the results of a random sample of items from the shipment. For instance, suppose a contract calls for, at most, 10 percent of the items in a shipment to be red. To check this without looking at every item in the large shipment, a sample of $n = 10$ items is selected. If 1 or fewer are red, the shipment is accepted; otherwise it is rejected. Using probability, determine whether this is a "good" sampling plan. (Assume that a bad shipment is one that has 20 percent reds.)

Answer: The sampling plan calls for a random sample of $n = 10$ items with a cut-off of $a = 1$ red items. If 1 or fewer reds are found the shipment will be accepted; otherwise it will be rejected. The objectives are:

1. If the shipment meets the contract (no greater than 10 percent reds) we want to accept the shipment.
2. If the shipment violates the contract (more than 10 percent reds) we want to reject the shipment.

The binomial distribution can be used to determine the probability of meeting these objectives. First, we find $P(x \leq 1, n = 10, p = 0.10)$ from the binomial table to be 0.7361. This is the probability that we will meet the first objective. Next, we find $P(x \geq 2, n = 10, p = 0.20)$ from the binomial table to be 0.6242, which is the probability of meeting the second objective. We would like both probabilities to be high (close to 1.000). These are middle-of-the-road and we most likely would conclude that the plan as stated is inadequate. However, the final decision needs to be based on the costs of not meeting the desired objectives.

Diff: 3

Keywords: binomial distribution, sampling plan

Section: 5-2 The Binomial Probability Distribution

Outcome: 2

158) The Swanson Auto Body business repaints cars that have been in an accident or which are in need of a new paint job. Its quality standards call for an average of 1.2 paint defects per door panel. Explain why there is a difference between the probability of finding exactly 1 defect when 1 door panel is inspected and finding exactly 2 defects when 2 doors are inspected.

Answer: First, using the Poisson distribution, the probability of exactly 1 defect when 1 door panel is inspected is 0.3614. The probability of twice that many defects ($x = 2$) when 2 door panels are examined is 0.2613. The reason that these probabilities are different, even though it might seem like they should be the same, is that when the mean is changed from 1.2 to 2.4 when going from 1 to 2 door panels, the total probability (that sums to 1.0 for the probability distribution) is spread over more possible outcomes, and that means that the probability of any one individual value occurring will be lower.

Diff: 3

Keywords: Poisson distribution, probability

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

159) Under what conditions is the binomial distribution symmetric?

Answer: The binomial distribution is perfectly symmetric when $p = 0.50$ for any size sample. It also approaches symmetry when p is not equal to 0.50 as the sample size increases.

Diff: 2

Keywords: binomial distribution, symmetric

Section: 5-3 Other Discrete Probability Distributions

Outcome: 2

160) The manager of a fast food store realizes that his staffing problems are a result of the variation in the number of customers that arrive at the store. If the same number of customers came each hour, she would know exactly how many servers to have working. It turns out that the Poisson distribution works well to describe the arrivals of customers in any given hour. Explain why the manager has more trouble staffing the store during those hours when the average arrival rate is higher.

Answer: The Poisson distribution has a very special characteristic, the standard deviation is equal to the square root of the mean. Thus, when the mean is small, the standard deviation is also small making it easier to plan. However, in hours where the mean arrival rate is higher, the standard deviation is also higher, thereby causing staffing problems.

Diff: 2

Keywords: Poisson distribution, standard deviation, mean

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3

161) A mid-management team consists of 10 people, 6 males and 4 females. Recently top management selected 4 people from this team for promotion. It was stated that the selections were based on random selection. All 4 people selected were males. The females are upset and believe that there may have been more than random selection involved here. What probability distribution should be used to analyze this situation and what is the probability that all 4 promotions would go to males if the selections were random? Do you believe that the females have a valid complaint in this situation?

Answer: The appropriate probability distribution in this case is the hypergeometric since the number of promotions given is discrete and since the sampling is without replacement from a finite population. The probability that 4 out of 4 promotions would go to males can be computed using the hypergeometric formula:

$$P(x) = \frac{C_{n-x}^{N-X} \cdot C_x^X}{C_n^N}$$

Where:

$x = 0$ = number of females selected

$N = 10$ employees

$X = 4$ = number of females

$n = 4$ = number of promotions granted

Then we get:

$$P(0) = \frac{C_{4-0}^{10-4} \cdot C_0^4}{C_4^{10}} = \frac{15 \cdot 1}{210} = \frac{15}{210} = .0714$$

Therefore, there is a .0714 chance that this result would occur due to chance alone. This is a fairly small probability. Thus, we might not expect to see such a result. The females have some evidence to support a claim that something other than random selection was involved. However, there is still a .07 chance that this result would come from random selection.

Diff: 2

Keywords: hypergeometric distribution, probability

Section: 5-3 Other Discrete Probability Distributions

Outcome: 3