**CHAPTER 7**

**DISCRETE PROBABILITY DISTRIBUTIONS**

**CHAPTER LEARNING OBJECTIVES**

1. Describe a discrete probability distribution using a table, histogram, or a formula.

2. Solve problems involving the discrete uniform distribution.

3. Solve problems involving the binomial distribution using the binomial formula and Excel.

4. Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

5. Solve problems involving the Poisson distribution using the Poisson formula and Excel.

6. Solve problems involving the geometric distribution using the geometric formula and the cumulative geometric formula and the cumulative geometric formula.

**TRUE-FALSE STATEMENTS**

1. In a binomial experiment, any single trial contains only two possible outcomes and successive trials are independent.

Answer: True

Difficulty: Medium

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Communication

Bloomcode: Knowledge

2. In a binomial distribution, *π*, the probability of getting a successful outcome on any single trial, increases proportionately with every success.

Answer: False

Difficulty: Medium

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Communication

Bloomcode: Knowledge

3. The assumption of independent trials in a binomial distribution is **not** a great concern if the sample size is smaller than 1/20th of the population size.

Answer: True

Difficulty: Medium

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Communication

Bloomcode: Knowledge

4. For a binomial distribution in which the probability of success is *π* = 0.5, the variance is twice the mean.

Answer: False

Difficulty: Hard

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Analytic

Bloomcode: Reflective Thinking

5. A hypergeometric distribution applies to experiments in which the trials represent sampling with replacement.

Answer: False

Difficulty: Easy

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Communication

Bloomcode: Knowledge

6. As in a binomial distribution, each trial of a hypergeometric distribution results in one of two mutually exclusive outcomes, i.e., either a success or a failure.

Answer: True

Difficulty: Medium

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Communication

Bloomcode: Knowledge

7. The number of successes in a hypergeometric distribution is unknown.

Answer: False

Difficulty: Hard

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Communication

Bloomcode: Knowledge

8. In a hypergeometric distribution the population, N, is finite and known.

Answer: True

Difficulty: Hard

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Communication

Bloomcode: Knowledge

9. The Poisson distribution is a continuous distribution which is very useful in solving waiting time problems.

Answer: False

Difficulty: Easy

Learning Objective: Solve problems involving the Poisson distribution using the Poisson formula and Excel.

Section Reference: 7.5 Poisson Distribution

AACSB: Communication

Bloomcode: Knowledge

10. Both the Poisson and the binomial distributions are discrete distributions and both have a given number of trials.

Answer: False

Difficulty: Medium

Learning Objective: Solve problems involving the Poisson distribution using the Poisson formula and Excel.

Section Reference: 7.5 Poisson Distribution

AACSB: Communication

Bloomcode: Comprehension

11. The Poisson distribution is best suited to describe occurrences of rare events in a situation where each occurrence is independent of the other occurrences.

Answer: True

Difficulty: Easy

Learning Objective: Solve problems involving the Poisson distribution using the Poisson formula and Excel.

Section Reference: 7.5 Poisson Distribution

AACSB: Communication

Bloomcode: Knowledge

12. For the Poisson distribution the mean represents twice the value of the standard deviation.

Answer: False

Difficulty: Easy

Learning Objective: Solve problems involving the Poisson distribution using the Poisson formula and Excel.

Section Reference: 7.5 Poisson Distribution

AACSB: Communication

Bloomcode: Knowledge

13. A binomial distribution is better than a Poisson distribution to describe the occurrence of major oil spills in the Gulf of Mexico.

Answer: False

Difficulty: Medium

Learning Objective: Solve problems involving the Poisson distribution using the Poisson formula and Excel.

Section Reference: 7.5 Poisson Distribution

AACSB: Communication

Bloomcode: Comprehension

14. For the Poisson distribution the mean and the variance are the same.

Answer: True

Difficulty: Easy

Learning Objective: Solve problems involving the Poisson distribution using the Poisson formula and Excel.

Section Reference: 7.5 Poisson Distribution

AACSB: Communication

Bloomcode: Knowledge

15. Poisson distribution describes the occurrence of *discrete* events that may occur over a *continuous* interval of time or space.

Answer: True

Difficulty: Hard

Learning Objective: Solve problems involving the Poisson distribution using the Poisson formula and Excel.

Section Reference: 7.5 Poisson Distribution

AACSB: Communication

Bloomcode: Knowledge

16. A Poisson distribution is characterized by one parameter.

Answer: True

Difficulty: Medium

Learning Objective: Solve problems involving the Poisson distribution using the Poisson formula and Excel.

Section Reference: 7.5 Poisson Distribution

AACSB: Communication

Bloomcode: Knowledge

**MULTIPLE CHOICE QUESTIONS**

17. The probabilities that a student wins $50,000, $20,000 or $12,000 are 0.7, 0.2 and 0.1 respectively. The expected value of the random *x* = win is approximately.

a) $37,800.

b) $40,200.

c) –$37,800.

d) –$40,200.

e) 0.

Answer: b

Difficulty: Easy

Learning Objective: Describe a discrete probability distribution using a table, histogram, or formula.

Section Reference: 7.1 Describing a Discrete Probability Distribution

AACSB: Analytic

Bloomcode: Application

18. The manager of a home improvement store is studying the number of on-the-job-accidents recorded. The manager provided the following probability distribution for a particular month:

|  |  |
| --- | --- |
| *Number of accidents (x)* | *P*(*x*) |
| 0 | .40 |
| 1 | .20 |
| 2 | .20 |
| 3 | .10 |
| 4 | .10 |

The mean of this distribution is \_\_\_.

a) 2.1

b) 3.0

c) 1.3

d) 5

e) <1

Answer: c

Difficulty: Easy

Learning Objective: Describe a discrete probability distribution using a table, histogram, or formula.

Section Reference: 7.1 Describing a Discrete Probability Distribution

AACSB: Analytic

Bloomcode: Application

19. The manager of a home improvement store is studying the number of on-the-job-accidents recorded. The manager provided the following probability distribution for a particular month:

|  |  |
| --- | --- |
| *Number of accidents (x)* | *P*(*x*) |
| 0 | .40 |
| 1 | .20 |
| 2 | .20 |
| 3 | .10 |
| 4 | .10 |

The standard deviation of this distribution is \_\_\_.

a) 1.800

b) 1.345

c) 1.400

d) 4.000

e) 1.457

Answer: b

Difficulty: Easy

Learning Objective: Describe a discrete probability distribution using a table, histogram, or formula.

Section Reference: 7.1 Describing a Discrete Probability Distribution

AACSB: Analytic

Bloomcode: Application

20. You are offered an investment opportunity. Its outcomes and probabilities are presented in the following table:

|  |  |
| --- | --- |
| *x* | *P*(*x*) |
| $5000 | 0.3 |
| $2000 | 0.5 |
| $1,200 | 0.2 |
| $0 | 0.1 |

Which of the following statements is true?

a) This distribution is skewed to the right.

b) This is a binomial distribution.

c) This distribution is symmetric.

d) This distribution is skewed to the left.

e) This is a Poisson distribution.

Answer: d

Difficulty: Easy

Learning Objective: Describe a discrete probability distribution using a table, histogram, or formula.

Section Reference: 7.1 Describing a Discrete Probability Distribution

AACSB: Reflective Thinking

Bloomcode: Application

21. The probability distribution for the daily demand of laptops at a local store is shown below. In this distribution, the random variable x is the daily demand of laptops:

|  |  |
| --- | --- |
| *x* | *P*(*x*) |
| 0 | 0.30 |
| 1 | 0.10 |
| 2 | 0.50 |
| 3 | 0.10 |

The mean (average) value of *x* is \_\_\_.

a) 1.4

b) 1.75

c) 2.10

d) 2.55

e) 3.02

Answer: a

Difficulty: Easy

Learning Objective: Describe a discrete probability distribution using a table, histogram, or formula.

Section Reference: 7.1 Describing a Discrete Probability Distribution

AACSB: Analytic

Bloomcode: Application

22. The probability distribution for the daily demand of laptops at a local store is shown below. In this distribution, the random variable x is the daily demand of laptops:

|  |  |
| --- | --- |
| *x* | *P*(*x*) |
| 0 | 0.30 |
| 1 | 0.10 |
| 2 | 0.50 |
| 3 | 0.10 |

The standard deviation of *x* is \_\_\_.

a) 1.02

b) 0.89

c) 1.40

d).506

e).588

Answer: a

Difficulty: Easy

Learning Objective: Describe a discrete probability distribution using a table, histogram, or formula.

Section Reference: 7.1 Describing a Discrete Probability Distribution

AACSB: Analytic

Bloomcode: Application

23. The probability distribution for the daily demand of laptops at a local store is shown below. In this distribution, the random variable x is the daily demand of laptops:

|  |  |
| --- | --- |
| *x* | *P*(*x*) |
| 0 | 0.10 |
| 1 | 0.10 |
| 2 | 0.50 |
| 3 | 0.30 |

Which of the following statements is true?

a) This distribution is skewed to the right.

b) This is a binomial distribution.

c) This is a normal distribution.

d) This distribution is skewed to the left.

e) This distribution is bimodal.

Answer: d

Difficulty: Easy

Learning Objective: Describe a discrete probability distribution using a table, histogram, or formula.

Section Reference: 7.1 Describing a Discrete Probability Distribution

AACSB: Reflective Thinking

Bloomcode: Application

24. The distribution of the number grade one students per household in a rural community is shown below. In this distribution, the random variable x is the number grade one students per household:

|  |  |
| --- | --- |
| *x* | *P*(*x*) |
| 0 | 0.30 |
| 1 | 0.50 |
| 2 | 0.10 |
| 3 | 0.10 |

The mean (average) value of *x* is \_\_\_.

a) 1.0

b) 1.5

c) 2.0

d) 2.5

e) 3.0

Answer: a

Difficulty: Easy

Learning Objective: Describe a discrete probability distribution using a table, histogram, or formula.

Section Reference: 7.1 Describing a Discrete Probability Distribution

AACSB: Analytic

Bloomcode: Application

25. The distribution of the number grade one students per household in a rural community is shown below. In this distribution, the random variable *x* is the number grade one students per household:

|  |  |
| --- | --- |
| *x* | *P*(*x*) |
| 0 | 0.30 |
| 1 | 0.50 |
| 2 | 0.10 |
| 3 | 0.10 |

The standard deviation of *x* is \_\_\_.

a) 1.00

b) 2.00

c) 0.80

d) 0.89

e) 1.09

Answer: d

Difficulty: Easy

Learning Objective: Describe a discrete probability distribution using a table, histogram, or formula.

Section Reference: 7.1 Describing a Discrete Probability Distribution

AACSB: Analytic

Bloomcode: Application

26. The formula for the mean of a discrete uniform distribution is

a) .

b) .

c) .

d) .

e) .

Answer: c

Difficulty: Medium

Learning Objective: Solve problems involving the discrete uniform distribution.

Section Reference: 7.2 Discrete Uniform Distribution

AACSB: Communication

Bloomcode: Knowledge

27. For a discrete uniform distribution, if *a* = 4 and *b* = 5, what is *P*(*x*=10)?

a) 0.5

b) 1.0

c) 1.5

d) –0.5

e) –1.0

Answer: a

Difficulty: Medium

Learning Objective: Solve problems involving the discrete uniform distribution.

Section Reference: 7.2 Discrete Uniform Distribution

AACSB: Analytic

Bloomcode: Application

28. For a discrete uniform distribution, if *a* = 4 and *b* = 5, what is the expected value?

a) 0.5

b) 4.5

c) 1.5

d) 9.0

e) 4.0

Answer: b

Difficulty: Medium

Learning Objective: Solve problems involving the discrete uniform distribution.

Section Reference: 7.2 Discrete Uniform Distribution

AACSB: Analytic

Bloomcode: Application

29. For a discrete uniform distribution, if *a* = 4 and *b* = 5, what is standard deviation?

a) 0.17

b) 0.29

c) 0.50

d) 1.00

e) 1.5

Answer: b

Difficulty: Medium

Learning Objective: Solve problems involving the discrete uniform distribution.

Section Reference: 7.2 Discrete Uniform Distribution

AACSB: Analytic

Bloomcode: Application

30. At A-Life Corporation, managers begin at $35/hour until they reach $50/hour (salaries are always to the nearest dollar). If the variable *x* = hourly wage has a discrete uniform distribution, what is the mean wage for the managers?

a) $28.33

b) $35.00

c) $37.50

d) $42.50

e) $50.00

Answer: d

Difficulty: Medium

Learning Objective: Solve problems involving the discrete uniform distribution.

Section Reference: 7.2 Discrete Uniform Distribution

AACSB: Analytic

Bloomcode: Application

31. At A-Life Corporation, managers begin at $35/hour until they reach $50/hour (salaries are always to the nearest dollar). If the variable *x* = hourly wage has a discrete uniform distribution, what is the standard deviation of *x*?

a) $7.50

b) $37.50

c) $42.50

d) $50.00

e) $56.25

Answer: a

Difficulty: Medium

Learning Objective: Solve problems involving the discrete uniform distribution.

Section Reference: 7.2 Discrete Uniform Distribution

AACSB: Analytic

Bloomcode: Application

32. At A-Life Corporation, managers begin at $35/hour until they reach $50/hour (salaries are always to the nearest dollar). If the variable *x* = hourly wage has a discrete uniform distribution, what is the probability that a manager’s wage is between $42 and $45?

a) 0.50

b) 0.35

c) 0.30

d) 0.25

e) 0.13

Answer: e

Difficulty: Medium

Learning Objective: Solve problems involving the discrete uniform distribution.

Section Reference: 7.2 Discrete Uniform Distribution

AACSB: Analytic

Bloomcode: Application

33. If *x* has a binomial distribution with *π* =.5, then the distribution of *x* is \_\_\_.

a) skewed to the right

b) skewed to the left

c) symmetric

d) a Poisson distribution

e) a hypergeometric distribution

Answer: c

Difficulty: Easy

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Reflective Thinking

Bloomcode: Application

34. If *x* is a binomial random variable with *n* = 10 and *π* = 0.8, the mean value of *x* is \_\_\_.

a) 6

b) 4.8

c) 3.2

d) 8

e) 48

Answer: d

Difficulty: Medium

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Analytic

Bloomcode: Application

35. If *x* is a binomial random variable with *n* = 10 and *π* = 0.8, the standard deviation of *x* is \_\_\_.

a) 8.0

b) 1.26

c) 1.60

d) 64.0

e) 10

Answer: b

Difficulty: Medium

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Analytic

Bloomcode: Application

36. If *x* is a binomial random variable with *n* = 10 and *π* = 0.8, what is the probability that *x* is equal to 4?

a).0055

b).0063

c).124

d).232

e).994

Answer: a

Difficulty: Medium

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Analytic

Bloomcode: Application

37. Twenty-five individuals are randomly selected out of 100 shoppers leaving a local bedding store. Each shopper was asked if they made a purchase during their visit. Each of the shoppers has the same probability of answering ‘yes’ to having made a purchase. The probability that exactly four of the twenty-five shoppers made a purchase could best be found by \_\_\_.

a) using the normal distribution

b) using the binomial distribution

c) using the Poisson distribution

d) using the exponential distribution

e) using the uniform distribution

Answer: b

Difficulty: Medium

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Reflective Thinking

Bloomcode: Comprehension

38. During a recent sporting event, a quarter is tossed to determine which team picks the starting side. Suppose the referee says the coin will be tossed 3 times and the best two out of three wins If team A calls ‘heads’, what is the probability that exactly two heads are observed in three tosses?

a).313

b).375

c).625

d).875

e).500

Answer: b

Difficulty: Medium

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Analytic

Bloomcode: Application

39. A student randomly guesses the answers to a five question true/false test. If there is a 50% chance of guessing correctly on each question, what is the probability that the student misses exactly 1 question?

a) 0.200

b) 0.031

c) 0.156

d) 0.073

e) 0.001

Answer: c

Difficulty: Medium

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Analytic

Bloomcode: Application

40. A student randomly guesses the answers to a five question true/false test. If there is a 50% chance of guessing correctly on each question, what is the probability that the student misses no questions?

a) 0.000

b) 0.200

c) 0.500

d) 0.031

e) 1.000

Answer: d

Difficulty: Medium

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Analytic

Bloomcode: Application

41. Pinky Bauer, Chief Financial Officer of Harrison Haulers, Inc., suspects irregularities in the payroll system, and orders an inspection of a random sample of vouchers issued since January 1, 2006. A sample of ten vouchers is randomly selected, without replacement, from the population of 2,000 vouchers. Each voucher in the sample is examined for errors and the number of vouchers in the sample with errors is denoted by *x*. If 20% of the population of vouchers contain errors, *P*(*x* > 0) is \_\_\_.

a) 0.8171

b) 0.1074

c) 0.8926

d) 0.3020

e) 1.0000

Answer: c

Difficulty: Medium

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Analytic

Bloomcode: Application

42. Pinky Bauer, Chief Financial Officer of Harrison Haulers, Inc., suspects irregularities in the payroll system, and orders an inspection of a random sample of vouchers issued since January 1, 2006. A sample of ten vouchers is randomly selected, without replacement, from the population of 2,000 vouchers. Each voucher in the sample is examined for errors and the number of vouchers in the sample with errors is denoted by *x*. If 20% of the population of vouchers contains errors, the mean value of *x* is \_\_\_.

a) 400

b) 2

c) 200

d) 5

e) 1

Answer: b

Difficulty: Medium

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Analytic

Bloomcode: Application

43. Pinky Bauer, Chief Financial Officer of Harrison Haulers, Inc., suspects irregularities in the payroll system, and orders an inspection of a random sample of vouchers issued since January 1, 2006. A sample of ten vouchers is randomly selected, without replacement, from the population of 2,000 vouchers. Each voucher in the sample is examined for errors and the number of vouchers in the sample with errors is denoted by *x*. If 20% of the population of vouchers contains errors, the standard deviation of *x* is \_\_\_.

a) 1.26

b) 1.60

c) 14.14

d) 3.16

e) 0.00

Answer: a

Difficulty: Medium

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Analytic

Bloomcode: Application

44. Dorothy Little purchased a mailing list of 2,000 names and addresses for her mail order business, but after scanning the list she doubts the authenticity of the list. She randomly selects five names from the list for validation. If 40% of the names on the list are non-authentic, and *x* is the number of non-authentic names in her sample, *P*(*x*=0) is \_\_\_.

a) 0.8154

b) 0.0467

c) 0.0778

d) 0.4000

e) 0.5000

Answer: c

Difficulty: Medium

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Analytic

Bloomcode: Application

45. Dorothy Little purchased a mailing list of 2,000 names and addresses for her mail order business, but after scanning the list she doubts the authenticity of the list. She randomly selects five names from the list for validation. If 40% of the names on the list are non-authentic, and *x* is the number of non-authentic names in her sample, *P*(*x*>0) is \_\_\_.

a) 0.2172

b) 0.9533

c) 0.1846

d) 0.9222

e) 1.0000

Answer: d

Difficulty: Medium

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Analytic

Bloomcode: Application

46. Dorothy Little purchased a mailing list of 2,000 names and addresses for her mail order business, but after scanning the list she doubts the authenticity of the list. She randomly selects five names from the list for validation. If 40% of the names on the list are non-authentic, and *x* is the number on non-authentic names in her sample, the expected (mean) value of *x* is \_\_\_.

a) 2.50

b) 2.00

c) 1.50

d) 1.25

e) 1.35

Answer: b

Difficulty: Medium

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Analytic

Bloomcode: Application

47. A large industrial firm allows a discount on any invoice that is paid within 30 days. Of all invoices, 10% receive the discount. In a company audit, 10 invoices are sampled at random. The probability that fewer than 3 of the 10 sampled invoices receive the discount is approximately \_\_\_.

a) 0.1937

b) 0.057

c) 0.001

d) 0.3486

e) 0.9298

Answer: e

Difficulty: Hard

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Analytic

Bloomcode: Application

48. A large industrial firm allows a discount on any invoice that is paid within 30 days. Of all invoices, 10% receive the discount. In a company audit, 15 invoices are sampled at random. The mean (average) value of the number of the 15 sampled invoices that receive discount is \_\_\_.

a) 1

b) 3

c) 1.5

d) 2

e) 10

Answer: c

Difficulty: Medium

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Analytic

Bloomcode: Application

49. Which of the following conditions is **not** a condition for the hypergeometric distribution?

a) The probability of success is the same on each trial.

b) Sampling is done without replacement.

c) There are only two possible outcomes.

d) Trials are dependent.

e) *n* < 5%N.

Answer: a

Difficulty: Hard

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Reflective Thinking

Bloomcode: Comprehension

50. The hypergeometric distribution must be used instead of the binomial distribution when

a) sampling is done with replacement.

b) sampling is done without replacement.

c) *n* ≥ 5% *N.*

d) both b and c

e) there are more than two possible outcomes.

Answer: d

Difficulty: Hard

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Reflective Thinking

Bloomcode: Comprehension

51. The probability of selecting 2 baseball players and 3 basketball players for an intermural competition at a small sports camp would best be modelled with the \_\_\_.

a) binomial distribution

b) hypergeometric distribution

c) Poisson distribution

d) hyperbinomial distribution

e) exponential distribution

Answer: b

Difficulty: Medium

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Reflective Thinking

Bloomcode: Comprehension

52. The probability of selecting 3 executive employees and 7 administrative employees to win a promotional trip a company with 10 executive and 50 administrative employees would best be modelled with the \_\_\_.

a) binomial distribution

b) hypergeometric distribution

c) Poisson distribution

d) hyperbinomial distribution

e) exponential distribution

Answer: b

Difficulty: Medium

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Reflective Thinking

Bloomcode: Comprehension

53. Suppose an interdisciplinary committee of 3 faculty members is to be selected from a group consisting of 4 business faculty and 5 engineering faculty members. The probability that all three faculty selected are all in business is approximately \_\_\_.

a) 0.05

b) 0.33

c) 0.11

d) 0.80

e) 0.90

Answer: a

Difficulty: Medium

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Analytic

Bloomcode: Application

54. Suppose an interdisciplinary committee of 3 faculty members is to be selected from a group consisting of 4 business faculty and 5 engineering faculty members. The probability that one business faculty and two engineering faculty are selected is approximately \_\_\_.

a) 0.15

b) 0.06

c) 0.33

d) 0.48

e) 0.58

Answer: d

Difficulty: Medium

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Analytic

Bloomcode: Application

55. Aluminum castings are processed in lots of five each. A sample of two castings is randomly selected from each lot for inspection. A particular lot contains one defective casting; and *x* is the number of defective castings in the sample. *P*(*x*=0) is \_\_\_.

a) 0.2

b) 0.4

c) 0.6

d) 0.8

e) 1.0

Answer: c

Difficulty: Medium

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Analytic

Bloomcode: Application

56. Aluminum castings are processed in lots of five each. A sample of two castings is randomly selected from each lot for inspection. A particular lot contains one defective casting; and *x* is the number of defective castings in the sample. *P*(*x*=1) is \_\_\_.

a) 0.2

b) 0.4

c) 0.6

d) 0.8

e) 1.0

Answer: b

Difficulty: Medium

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Analytic

Bloomcode: Application

57. Circuit boards for wireless telephones are etched, in an acid bath, in batches of 100 boards. A sample of seven boards is randomly selected from each lot for inspection. A batch contains two defective boards; and *x* is the number of defective boards in the sample. *P*(*x*=1) is \_\_\_.

a) 0.1315

b) 0.8642

c) 0.0042

d) 0.6134

e) 0.6789

Answer: a

Difficulty: Hard

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Analytic

Bloomcode: Application

58. Circuit boards for wireless telephones are etched, in an acid bath, in batches of 100 boards. A sample of seven boards is randomly selected from each lot for inspection. A particular batch contains two defective boards; and *x* is the number of defective boards in the sample. *P*(*x*=2) is \_\_\_.

a) 0.1315

b) 0.8642

c) 0.0042

d) 0.6134

e) 0.0034

Answer: c

Difficulty: Hard

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Analytic

Bloomcode: Application

59. Circuit boards for wireless telephones are etched, in an acid bath, in batches of 100 boards. A sample of seven boards is randomly selected from each lot for inspection. A particular batch contains two defective boards; and *x* is the number of defective boards in the sample. *P*(*x*=0) is \_\_\_.

a) 0.1315

b) 0.8642

c) 0.0042

d) 0.6134

e) 0.8134

Answer: b

Difficulty: Hard

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Analytic

Bloomcode: Application

60. Ten policyholders file claims with CareFree Insurance. Three of these claims are fraudulent. Claims manager Earl Evans randomly selects three of the ten claims for thorough investigation. If *x* represents the number of fraudulent claims in Earl's sample, *P*(*x*=0) is \_\_\_.

a) 0.0083

b) 0.3430

c) 0.0000

d) 0.2917

e) 0.8917

Answer: d

Difficulty: Hard

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Analytic

Bloomcode: Application

61. Ten policyholders file claims with CareFree Insurance. Three of these claims are fraudulent. Claims manager Earl Evans randomly selects three of the ten claims for thorough investigation. If *x* represents the number of fraudulent claims in Earl's sample, *P*(*x*=1) is \_\_\_.

a) 0.5250

b) 0.4410

c) 0.3000

d) 0.6957

e) 0.9957

Answer: a

Difficulty: Hard

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Analytic

Bloomcode: Application

62. If sampling is performed without replacement, the hypergeometric distribution should be used. However, the binomial may be used to approximate this if \_\_\_.

a) *n* > 5%N

b) *n* < 5%N

c) the population size is very small

d) there are more than two possible outcomes of each trial

e) the outcomes are continuous

Answer: b

Difficulty: Hard

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Reflective Thinking

Bloomcode: Comprehension

63. One hundred policyholders file claims with CareFree Insurance. Ten of these claims are fraudulent. Claims manager Earl Evans randomly selects four of the one hundred claims for thorough investigation. If *x* represents the number of fraudulent claims in Earl's sample, *x* has a \_\_\_ distribution.

a) continuous

b) normal

c) binomial

d) hypergeometric

e) exponential

Answer: d

Difficulty: Medium

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Reflective Thinking

Bloomcode: Comprehension

64. One hundred policyholders file claims with CareFree Insurance. Ten of these claims are fraudulent. Claims manager Earl Evans randomly selects four of the one hundred claims for thorough investigation. If *x* represents the number of fraudulent claims in Earl's sample, *x* has a \_\_\_.

a) normal distribution

b) hypergeometric distribution, but may be approximated by a binomial

c) binomial distribution, but may be approximated by a normal

d) binomial distribution, but may be approximated by a Poisson

e) exponential distribution

Answer: b

Difficulty: Medium

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Reflective Thinking

Bloomcode: Synthesis

65. In a certain communications system, there is an average of 1 transmission error per 10 seconds. Assume that the distribution of transmission errors is Poisson. The probability of 1 error in a period of one-half minute is approximately \_\_\_

a) 0.1493

b) 0.3333

c) 0.3678

d) 0.1336

e) 0.03

Answer: a

Difficulty: Hard

Learning Objective: Solve problems involving the Poisson distribution using the Poisson formula and Excel.

Section Reference: 7.5 Poisson Distribution

AACSB: Analytic

Bloomcode: Application

66. The number of cars arriving at a toll booth in five-minute intervals is Poisson distributed with a mean of 3 cars arriving in five-minute time intervals. The probability of 5 cars arriving over a five-minute interval is \_\_\_.

a) 0.0940

b) 0.0417

c) 0.1500

d) 0.1008

e) 0.2890

Answer: d

Difficulty: Medium

Learning Objective: Solve problems involving the Poisson distribution using the Poisson formula and Excel.

Section Reference: 7.5 Poisson Distribution

AACSB: Analytic

Bloomcode: Application

67. The number of cars arriving at a toll booth in five-minute intervals is Poisson distributed with a mean of 3 cars arriving in five-minute time intervals. The probability of 3 cars arriving over a five-minute interval is \_\_\_.

a) 0.2700

b) 0.0498

c) 0.2240

d) 0.0001

e) 0.0020

Answer: c

Difficulty: Medium

Learning Objective: Solve problems involving the Poisson distribution using the Poisson formula and Excel

Section Reference: 7.5 Poisson Distribution

AACSB: Analytic

Bloomcode: Application

68. Assume that a random variable has a Poisson distribution with a mean of 5 occurrences per ten minutes. The number of occurrences per hour follows a Poisson distribution with λ equal to \_\_\_.

a) 5

b) 60

c) 30

d) 10

e) 20

Answer: c

Difficulty: Hard

Learning Objective: Solve problems involving the Poisson distribution using the Poisson formula and Excel.

Section Reference: 7.5 Poisson Distribution

AACSB: Analytic

Bloomcode: Application

69. On Monday mornings, customers arrive at the coffee shop drive thru at the rate of 6 cars per fifteen-minute interval. Using the Poisson distribution, the probability that five cars will arrive during the next fifteen-minute interval is \_\_\_.

a) 0.1008

b) 0.0361

c) 0.1339

d) 0.1606

e) 0.5000

Answer: d

Difficulty: Medium

Learning Objective: Solve problems involving the Poisson distribution using the Poisson formula and Excel.

Section Reference: 7.5 Poisson Distribution

AACSB: Analytic

Bloomcode: Application

70. On Monday mornings, customers arrive at the coffee shop drive thru at the rate of 6 cars per fifteen-minute interval. Using the Poisson distribution, the probability that five cars will arrive during the next five-minute interval is \_\_\_.

a) 0.1008

b) 0.0361

c) 0.1339

d) 0.1606

e) 0.3610

Answer: b

Difficulty: Hard

Learning Objective: Solve problems involving the Poisson distribution using the Poisson formula and Excel.

Section Reference: 7.5 Poisson Distribution

AACSB: Analytic

Bloomcode: Application

71. The number of bags arriving on the baggage claim conveyor belt in a 3-minute time period would best be modelled with the \_\_\_.

a) binomial distribution

b) hypergeometric distribution

c) Poisson distribution

d) hyperbinomial distribution

e) geometric distribution

Answer: c

Difficulty: Medium

Learning Objective: Solve problems involving the Poisson distribution using the Poisson formula and Excel.

Section Reference: 7.5 Poisson Distribution

AACSB: Reflective Thinking

Bloomcode: Comprehension

72. The number of defects per 1,000 feet of extruded plastic pipe is best modelled with the \_\_\_.

a) Poisson distribution

b) Pascal distribution

c) binomial distribution

d) hypergeometric distribution

e) geometric distribution

Answer: a

Difficulty: Medium

Learning Objective: Solve problems involving the Poisson distribution using the Poisson formula and Excel.

Section Reference: 7.5 Poisson Distribution

AACSB: Reflective Thinking

Bloomcode: Comprehension

73. Which of the following random variables is geometric?

a) the number of phone calls received in a one-hour period

b) the number of cards I need to deal from a deck of 52 cards that has been thoroughly shuffled

so that at least one of the cards is a heart

c) the number of digits I will read beginning at a randomly selected starting point in a table of

random digits until I find a 7

d) all of the above

e) none of the above

Answer: c

Difficulty: Medium

Learning Objective: Solve problems involving the geometric distribution using the geometric formula and the cumulative geometric formula.

Section Reference: 7.6 Geometric Distribution

AACSB: Reflective Thinking

Bloomcode: Application

74. The probability that a student will pass an exam on any trial is 0.7. What is the probability that he will pass on the first trial?

a) 0.7

b) 0.21

c) 0.06

d) 0.021

e) 1.00

Answer: a

Difficulty: Medium

Learning Objective: Solve problems involving the geometric distribution using the geometric formula and the cumulative geometric formula.

Section Reference: 7.6 Geometric Distribution

AACSB: Analytic

Bloomcode: Application

75. The probability that a student will pass an exam on any trial is 0.7. What is the expected number of trials needed to pass the exam?

a) 0.420

b) 0.428

c) 0.429

d) 1.420

e) 1.430

Answer: c

Difficulty: Medium

Learning Objective: Solve problems involving the geometric distribution using the geometric formula and the cumulative geometric formula.

Section Reference: 7.6 Geometric Distribution

AACSB: Analytic

Bloomcode: Application

76. The probability that a student will pass an exam on any trial is 0.7. What is the standard deviation of the number of trials needed to pass the exam?

a) 0.540

b) 0.548

c) 0.782

d) 0.880

e) 0.002

Answer: c

Difficulty: Medium

Learning Objective: Solve problems involving the geometric distribution using the geometric formula and the cumulative geometric formula.

Section Reference: 7.6 Geometric Distribution

AACSB: Analytic

Bloomcode: Application

77. Suppose *X* has a geometric distribution with probability 0.3 of success on each observation. The probability that *X* is 4 is

a) 0.0081.

b) 0.0189.

c) 0.1029.

d) 0.2401.

e) 0.2409.

Answer: c

Difficulty: Medium

Learning Objective: Solve problems involving the geometric distribution using the geometric formula and the cumulative geometric formula.

Section Reference: 7.6 Geometric Distribution

AACSB: Analytic

Bloomcode: Application

78. A basketball player makes 80% of her free throws. Suppose this probability is the same for each free throw she attempts. The probability that she doesn't make a free throw until her fifth attempt this season is

a) 0.32768.

b) 0.08192.

c) 0.00128.

d) 0.00032.

e) 0.00004.

Answer: c

Difficulty: Medium

Learning Objective: Solve problems involving the geometric distribution using the geometric formula and the cumulative geometric formula.

Section Reference: 7.6 Geometric Distribution

AACSB: Analytic

Bloomcode: Application

79. A basketball player makes 80% of her free throws. Suppose this probability is the same for each free throw she attempts. What is probability that she makes more than 5 free throw attempts this season?

a) 0.32

b) 0.032

c) 0.0032

d) 0.00032

e) 0.000030

Answer: d

Difficulty: Medium

Learning Objective: Solve problems involving the geometric distribution using the geometric formula and the cumulative geometric formula.

Section Reference: 7.6 Geometric Distribution

AACSB: Analytic

Bloomcode: Application

**SHORT ANSWER QUESTIONS**

80. The Human Resource manager of a corporation documents the frequency with which employees call in sick. The Human Resource manager develops the following probability distribution for the number of time staff called in sick in a particular month:

|  |  |
| --- | --- |
| *x* = number of times employees called in sick | (*x*) |
| 0 | 0.50 |
| 1 | 0.30 |
| 2 | 0.15 |
| 3 | 0.05 |
|  | 1.00 |

Determine the expected value and the standard deviation of the probability distribution.

Answer:

Expected value *μ* = ∑*xP(x) =* 0.75

\_\_\_\_\_\_\_\_\_\_\_

Standard deviation *σ* = √∑(*x* – *μ*)2 *P*(*x*) = 0.887

Difficulty: Medium

Learning Objective: Describe a discrete probability distribution using a table, histogram, or formula.

Section Reference: 7.1 Describing a Discrete Probability Distribution

AACSB: Analytic

Bloomcode: Analysis

81. At A-Life Corporation, managers begin at $35/hour until they reach $50/hour. If the variable *x* = hourly wage has a discrete uniform distribution, what is the probability that a manager’s wage is between $42 and $45?

Answer:

*P*(*x*) = 1/16

*P*(42 < *x* < 45) = *P*(*x* = 43) + *P*(*x* = 44) = 1/16 + 1/16 = 0.13

Difficulty: Medium

Learning Objective: Solve problems involving the discrete uniform distribution.

Section Reference: 7.2 Discrete Uniform Distribution

AACSB: Analytic

Bloomcode: Application

82. The records of a department store show that 20% of their customers who make a purchase return the merchandise for exchange. If the distribution of the random variable *x* describing the number of purchases is binomial,

a) what is the probability that at least 2 customers return the merchandise for exchange?

b) what is the expected number and standard deviation of customers who return the merchandise for exchange?

Answer:

a) *P*(*x* ≥ 2) = 1 – *P*(*x* < 2) = 1 – (*P*(*x* = 0) + *P*(*x* = 1)) = 1 – (0.3277 + 0.4096) = 0.2627

\_\_\_\_\_\_\_\_

b) *μ* = *nπ* = 5*x*0.2 = 1 and *σ* = √*n*π(1 – *π*) = 0.894

Difficulty: Medium

Learning Objective: Solve problems involving the binomial distribution using the binomial formula and Excel.

Section Reference: 7.3 Binomial Distribution

AACSB: Analytic

Bloomcode: Application

83. Suppose 18 major companies operate in Canada and 12 are located in Alberta. If three companies are randomly selected from the entire list, what is the probability that none is from Alberta?

Answer:



Difficulty: Medium

Learning Objective: Solve problems involving the hypergeometric distribution using the hypergeometric formula and Excel.

Section Reference: 7.4 Hypergeometric Distribution

AACSB: Analytic

Bloomcode: Application

84. The service centre of an automotive dealership expects an average of 4 complaints per day. Assume the number of complaints per day is described by a Poisson distribution,

a) what is the probability of at least 2 complaints?

b) how many complaints would you expect in a 2 day period?

Answer:

a) *μ* = 4

*P*(*x* ≥ 2) = 1 – *P*(*x* < 2) = 1 – (*P*(*x* = 0) + *P*(*x* = 1) = 1 – 0.0916 = 0.9084

b)  per 2 days

Difficulty: Medium

Learning Objective: Solve problems involving the Poisson distribution using the Poisson formula and Excel.

Section Reference: 7.5 Poisson Distribution

AACSB: Analytic

Bloomcode: Application

85. A basketball player makes 80% of his free throws. Suppose this probability is the same for each free throw she attempts. What is probability that he makes more than 5 free throw attempts this season?

Answer: *P*(*x* > 5) = (1 – *P*)5 = (0.2)5 = 0.00032

Difficulty: Medium

Learning Objective: Solve problems involving the geometric distribution using the geometric formula and the cumulative geometric formula.

Section Reference: 7.6 Geometric Distribution

AACSB: Analytic

Bloomcode: Application

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