Review: Chapter 4: Probability Distribution

1. Concepts:

Random Variable

Probability Distribution

Discrete random variable and Continuous random variable

Requirements for Probability Distribution

Expected Value of a discrete random variable

Binomial Probability Distribution

2. Practicing Problems:

Identify the given random variable as being discrete or continuous.

1) The cost of a randomly selected orange
A) Continuous B) Discrete

2) The number of oil spills occurring off the Alaskan coast
A) Discrete B) Continuous

3) The pH level in a shampoo
A) Continuous B) Discrete

4) The number of phone calls between New York and California on Thanksgiving day
A) Continuous B) Discrete

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question. Determine whether the following is a probability distribution. If not, identify the requirement that is not satisfied.

9)

x	*P(x)*
1	0.0370
2	0.2000
3	0.4440
4	0.2960

10)

x	*P(x)*
0	0.18
1	0.19
2	0.13
3	0.47
4	0.03

Find the mean of the given probability distribution.

16)

x	*P(x)*
0	0.17
1	0.16
2	0.07
3	0.40
4	0.20

A) 2.30 B) 2.47 C) 2.37 D) 2.20

17) The random variable x is the number of houses sold by a realtor in a single month at the Sendsom's Real Estate office. Its probability distribution is as follows.

x	*P(x)*
0	0.24
1	0.01
2	0.12
3	0.16
4	0.01
5	0.14
6	0.11
7	0.21

A) 3.60 B) 3.35 C) 3.50 D) 3.40

Solve the problem.

23) Find the variance for the given probability distribution.

x	*P(x)*
0	0.19
1	0.33
2	0.31
3	0.09
4	0.08

A) 3.66 B) 1.29 C) 1.52 D) 1.48

24) Find the standard deviation for the given probability distribution.

x	*P(x)*
0	0.05
1	0.30
2	0.11
3	0.34
4	0.20

A) 1.25 B) 1.23 C) 2.65 D) 1.52

Find the Expected Value

33) In a game, you have a 1/30 probability of winning $101 and a 29/30 probability of losing $8. What is your expected value?

A) $3.37 B) -$7.73 C) $11.10 D) -$4.37

34) A contractor is considering a sale that promises a profit of $ 23,000 with a probability of 0.7 or a loss (due to bad weather, strikes, and such) of $ 5000 with a probability of 0.3. What is the expected profit?

A) $ 14,600 B) $ 16,100 C) $ 19,600 D) $ 18,000

35) Suppose you pay $ 3.00 to roll a fair die with the understanding that you will get back $ 5.00 for rolling a 5 or a 3, nothing otherwise. What is your expected value?

A) $5.00 B) - $3.00 C) -$1.33 D) $3.00

36) Suppose you buy 1 ticket for $1 out of a lottery of 1,000 tickets where the prize for the one winning ticket is to be $500. What is your expected value?

A) -$0.50 B) -$0.40 C) -$1.00 D) $0.00

Answer the question.

44) Suppose that weight of adolescents is being studied by a health organization and that the accompanying tables describes the probability distribution for three randomly selected adolescents, where x is the number who are

considered morbidly obese. Is it unusual to have no obese subjects among three randomly selected adolescents?

x	P(x)
0	0.111
1	0.215
2	0.450
3	0.224

A) Yes B) No

45) Suppose that computer literacy among people ages 40 and older is being studied and that the accompanying tables describes the probability distribution for four randomly selected people, where x is the number that are computer literate. Is it unusual to find four computer literates among four randomly selected people?

x	P(x)
0	0.16
1	0.25
2	0.36
3	0.15
4	0.08

A) No B) Yes

Determine whether the given procedure results in a binomial distribution. If not, state the reason why.

48) Rolling a single die 56 times, keeping track of the numbers that are rolled.

A) Not binomial: there are more than two outcomes for each trial.
B) Procedure results in a binomial distribution.
C) Not binomial: there are too many trials.
D) Not binomial: the trials are not independent.

54) Choosing 10 marbles from a box of 40 marbles (20 purple, 12 red, and 8 green) one at a time with replacement, keeping track of the number of red marbles chosen.

A) Not binomial: the trials are not independent.
B) Not binomial: there are too many trials.
C) Not binomial: there are more than two outcomes for each trial.
D) Procedure results in a binomial distribution.

Find the mean, m, for the binomial distribution which has the stated values of n and p. Round answer to the nearest tenth.

76) n = 39; p = .2

A) m = 7.8 B) m = 7.3 C) m = 8.1 D) m = 8.5

77) n = 36; p = 3/5

A) m = 21.1 B) m = 21.9 C) m = 22.3 D) m = 21.6

Find the standard deviation, s, for the binomial distribution which has the stated values of n and p. Round your answer to the nearest hundredth.

81) n = 48; p = .2

A) s = 2.77 B) s = 6.89 C) s = 6.04 D) s = 0.36

82) n = 50; p = 3/5

A) s = 1.05 B) s = 7.58 C) s = 3.46 D) s = 6.73

Use the given values of n and p to find the minimum usual value m - 2s and the maximum usual value m + 2s.

87) n = 95, p = 0.21

A) Minimum: 15.98; maximum: 23.92
B) Minimum: 12.01; maximum: 27.89

C) Minimum: 27.89; maximum: 12.01
D) Minimum: -11.57; maximum: 51.47

88) n = 153, p = 0.13
A) Minimum: 11.57; maximum: 28.21
B) Minimum: -14.72; maximum: 54.5
C) Minimum: 28.21; maximum: 11.57
D) Minimum: 15.73; maximum: 24.05

Solve the problem.

97) According to a college survey, 22% of all students work full time. Find the mean for the number of students who work full time in samples of size 16.
A) 3.52 B) 0.22 C) 2.75 D) 4.00

98) A die is rolled 9 times and the number of times that two shows on the upper face is counted. If this experiment is repeated many times, find the mean for the number of twos.
A) 7.5 B) 2.25 C) 1.5 D) 3

99) On a multiple choice test with 19 questions, each question has four possible answers, one of which is correct. For students who guess at all answers, find the mean for the number of correct answers.
A) 9.5 B) 4.8 C) 14.3 D) 6.3

Solve the problem.

106) According to a college survey, 22% of all students work full time. Find the standard deviation for the number of students who work full time in samples of size 16.
A) 1.66 B) 2.75 C) 3.52 D) 1.88

107) A die is rolled 14 times and the number of twos that come up is tallied. If this experiment is repeated many times, find the standard deviation for the number of twos.
A) 1.344 B) 1.394 C) 1.87 D) 1.4

108) On a multiple choice test with 27 questions, each question has four possible answers, one of which is correct. For students who guess at all answers, find the standard deviation for the number of correct answers.
A) 2.205 B) 2.163 C) 2.208 D) 2.25

Determine if the outcome is unusual. Consider as unusual any result that differs from the mean by more than 2 standard deviations. That is, unusual values are either less than m - 2s or greater than m + 2s.

115) A survey for brand recognition is done and it is determined that 68% of consumers have heard of Dull Computer Company. A survey of 800 randomly selected consumers is to be conducted. For such groups of 800, would it be unusual to get 625 consumers who recognize the Dull Computer Company name?
A) Yes B) No

116) A survey for brand recognition is done and it is determined that 68% of consumers have heard of Dull Computer Company. A survey of 800 randomly selected consumers is to be conducted. For such groups of 800, would it be unusual to get 468 consumers who recognize the Dull Computer Company name?
A) Yes B) No

SOLUTIONS:

1) Answer: B
2) Answer: A
3) Answer: A
4) Answer: B

9) Answer: Not a probability distribution. The sum of the P(x)'s is not 1.
10) Answer: Probability distribution.

16) Answer: A
17) Answer: A

23) Answer: B
24) Answer: B

33) Answer: D
34) Answer: A
35) Answer: C
36) Answer: A

44) Answer: B
45) Answer: A

48) Answer: A
54) Answer: D

76) Answer: A
77) Answer: D

81) Answer: A
82) Answer: C

87) Answer: B
88) Answer: A

97) Answer: A
98) Answer: C
99) Answer: B

106) Answer: A
107) Answer: B
108) Answer: D

115) Answer: A
116) Answer: A