

Chapter 6

Discrete Probability Distributions

True/False

1. A random variable represents the outcomes of an experiment.
Answer: True Difficulty: Easy Goal: 1
2. A discrete random variable can have only certain clearly separated values.
Answer: True Difficulty: Easy Goal: 2
3. A discrete variable may assume fractional or decimal values, but they must have distance between them.
Answer: True Difficulty: Easy Goal: 2
4. The random variable for a Poisson probability distribution can assume an infinite number of values.
Answer: True Difficulty: Easy Goal: 6
5. A probability distribution is a mutually exclusive listing of experimental outcomes that can occur by chance and their corresponding probabilities.
Answer: True Difficulty: Easy Goal: 1
6. To construct a binomial probability distribution, the number of trials and the probability of success must be known.
Answer: True Difficulty: Easy Goal: 4
7. The Poisson probability distribution is a continuous probability distribution.
Answer: False Difficulty: Easy Goal: 6
8. A binomial distribution has a characteristic that the trials are independent, which means that the outcome of one trial does not affect the outcome of any other trial.
Answer: True Difficulty: Easy Goal: 4
9. For a binomial distribution, outcomes of an experiment are classified into one of two mutually exclusive categories (a success or a failure).
Answer: True Difficulty: Easy Goal: 4
10. For a binomial distribution, the data collected are the result of counts.
Answer: True Difficulty: Easy Goal: 4
11. A Poisson distribution is a discrete probability distribution. It has the same four characteristics as the binomial, but in addition, the probability of a success is small and the number of trials is relatively large.
Answer: True Difficulty: Easy Goal: 6
12. A random variable may be either discrete or continuous.
Answer: True Difficulty: Easy Goal: 2 AACSB: REF
13. The mean of a binomial probability distribution can be determined by multiplying the probability of a failure by the number of trials.
Answer: False Difficulty: Medium Goal: 4
14. A binomial distribution is a continuous probability distribution.
Answer: False Difficulty: Easy Goal: 4
15. The binomial and Poisson distributions are discrete probability distributions.
Answer: True Difficulty: Easy Goal: 4, 6
16. To construct a binomial distribution, it is necessary to know the total number of trials and the

probability of success on each trial.

Answer: True Difficulty: Easy Goal: 4

17. If the probability of success (π) remains the same, but n increases, the shape of the binomial distribution becomes more symmetrical.

Answer: True Difficulty: Medium Goal: 4

18. The mean of a probability distribution is called its expected value.

Answer: True Difficulty: Easy Goal: 1

19. The mean of a binomial distribution is the product of n and π .

Answer: True Difficulty: Easy Goal: 4

20. The variance of a binomial distribution is found by $n\pi(1 - \pi)$.

Answer: True Difficulty: Medium Goal: 4

Multiple Choice

21. If the variance of a probability was computed to be 3.6 grams, what is the standard deviation?

- A) 0.6
- B) 1.9
- C) 6.0
- D) 12.96

Answer: B Difficulty: Easy Goal: 3

22. Sixty percent of the customers of a fast food chain order the Whopper, french fries and a drink. If a random sample of 15 cash register receipts is selected, what is the probability that 10 or more will show that the above three food items were ordered?

- A) 1,000
- B) 0.186
- C) 0.403
- D) 0.000

Answer: C Difficulty: Medium Goal: 4 AACSB: AS

23. Judging from recent experience, 5 percent of the computer keyboards produced by an automatic, high-speed machine are defective. What is the probability that out of six keyboards selected at random, exactly zero keyboards will be defective?

- A) 0.001
- B) 0.167
- C) 0.735
- D) 0.500

Answer: C Difficulty: Hard Goal: 4

24. The probabilities and the number of automobiles lined up at a Lakeside Olds at opening time (7:30 a.m.) for service are:

Number	Probability
1	0.05
2	0.30
3	0.40
4	0.25

On a typical day, how many automobiles should Lakeside Olds expect to be lined up at opening?

- A) 10.00
- B) 1.00

C) 2.85

D) 1.96

Answer: C Difficulty: Medium Goal: 3

25. On a very hot summer day, 5 percent of the production employees at Midland States Steel are absent from work. The production employees are randomly selected for a special in-depth study on absenteeism. What is the probability of randomly selecting 10 production employees on a hot summer day and finding that none of them are absent?

A) 0.002

B) 0.344

C) 0.599

D) 0.100

Answer: C Difficulty: Hard Goal: 4

26. An insurance agent has appointments with four prospective clients tomorrow. From past experience the agent knows that the probability of making a sale on any appointment is 1 out of 5. Using the rules of probability, what is the likelihood that the agent will sell a policy to 3 of the 4 prospective clients?

A) 0.250

B) 0.500

C) 0.410

D) 0.026

Answer: D Difficulty: Medium Goal: 5

27. Sweetwater & Associates write weekend trip insurance at a very nominal charge. Records show that the probability that a motorist will have an accident during the weekend and file a claim is 0.0005. Suppose they wrote 400 policies for the coming weekend, what is the probability that exactly two claims will be filed?

A) 0.8187

B) 0.2500

C) 0.0164

D) 0.0001

Answer: C Difficulty: Medium Goal: 6

28. What is a listing of all possible outcomes of an experiment and their corresponding probability of occurrence called?

A) Random variable

B) Probability distribution

C) Subjective probability

D) Frequency distribution

Answer: B Difficulty: Easy Goal: 1

29. What kind of distribution are the binomial and Poisson distributions?

A) Discrete

B) Continuous

C) Both discrete and continuous

D) Neither discrete or continuous

Answer: A Difficulty: Easy Goal: 2 AACSB: CA

30. Which of the following is correct about a probability distribution?

A) Sum of all possible outcomes must equal 1

B) Outcomes must be mutually exclusive

C) Probability of each outcome must be between 0 and 1 inclusive

D) All of the above

Answer: D Difficulty: Easy Goal: 1

31. What is the following table called?

Number of Heads	Probability of Outcome
0	$1/8 = 0.125$
1	$3/8 = 0.375$
2	$3/8 = 0.375$
3	$1/8 = 0.125$

- A) Probability distribution
- B) Cumulative frequency distribution
- C) Standard deviation
- D) Frequency table

Answer: A Difficulty: Easy Goal: 1

32. What is the only variable in the Poisson probability formula?

- A) π
- B) x
- C) e
- D) P

Answer: B Difficulty: Medium Goal: 6

33. In a Poisson distribution the variance is equal to

- A) $n\pi$.
- B) $\frac{\Sigma x}{n}$
- C) e^{-x} .
- D) $\frac{\mu^x e^{-\mu}}{x!}$
- E) zero.

Answer: A Difficulty: Easy Goal: 6

Multiple Choice Questions

Use the following to answer questions 96-99:

David's gasoline station offers 4 cents off per gallon if the customer pays in cash and does not use a credit card. Past evidence indicates that 40% of all customers pay in cash. During a one-hour period twenty-five customers buy gasoline at this station.

96. What is the probability that at least ten pay in cash?

- A) 0.416
- B) 0.575
- C) 0.586
- D) 0.425

Answer: B Difficulty: Hard Goal: 4

97. What is the probability that no more than twenty pay in cash?

- A) 0.0
- B) 0.1
- C) 0.9
- D) 1.0

Answer: D Difficulty: Medium Goal: 4

98. What is the probability that more than ten and less than fifteen customers pay in cash?

- A) 0.541
- B) 0.401
- C) 0.380
- D) 0.562

Answer: C Difficulty: Hard Goal: 4

99. This situation is an example of what type of discrete probability distribution?

- A) Continuous probability distribution
- B) Poisson probability distribution
- C) Binomial probability distribution
- D) Hypergeometric probability distribution

Answer: C Difficulty: Medium Goal: 4

Use the following to answer questions 104-106:

A statistics professor receives an average of five e-mail messages per day from students. Assume the number of messages approximates a Poisson distribution.

104. What is the probability that on a randomly selected day she will have no messages?

- A) 0.0067
- B) zero
- C) 0.0335
- D) Impossible to have no messages

Answer: A Difficulty: Hard Goal: 6

105. What is the probability that on a randomly selected day she will have five messages?

- A) 0.0067
- B) 0.875
- C) 0.175
- D) 1.0

Answer: C Difficulty: Hard Goal: 6

106. What is the probability that on a randomly selected day she will have two messages?

- A) 0.0067
- B) 0.0014
- C) 0.420
- D) 0.084

Answer: D Difficulty: Medium Goal: 6

Use the following to answer questions 107-109:

A company is studying the number of monthly absences among its 125 employees. The following probability distribution shows the likelihood that people were absent 0, 1, 2, 3, 4, or 5 days last month.

<u>Number of days absent</u>	<u>Probability</u>
0	0.60
1	0.20
2	0.12
3	0.04
4	0.04
5	0

107. What is the mean number of days absent?

- A) 1.00
- B) 0.40
- C) 0.72
- D) 2.5

Answer: C Difficulty: Easy Goal: 3

108. What is the variance of the number of days absent?

- A) 1.99
- B) 1.41
- C) 5.00
- D) 55.52

Answer: A Difficulty: Medium Goal: 3

109. Given the probability distribution, which of the following predictions is correct?

- A) 60% of the employees will have more than one day absent for a month
- B) There is a 0.04 probability that an employee will be absent 1 day during a month
- C) There is a 0.12 probability that an employee will be absent 2 days during a month
- D) There is a 0.50 probability that an employee will be absent 0.72 days during a month.

Answer: C Difficulty: Easy Goal: 1