Quantitative Analysis for Management, 11e **(Render)**
Chapter 2   Probability Concepts and Applications

1) Subjective probability implies that we can measure the relative frequency of the values of the random variable.
Answer: FALSE
Diff: 2
Topic: FUNDAMENTAL CONCEPTS

2) The use of "expert opinion" is one way to approximate subjective probability values.
Answer: TRUE
Diff: 1
Topic: FUNDAMENTAL CONCEPTS

3) Mutually exclusive events exist if only one of the events can occur on any one trial.
Answer: TRUE
Diff: 2
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS

4) Stating that two events are statistically independent means that the probability of one event occurring is independent of the probability of the other event having occurred.
Answer: TRUE
Diff: 2
Topic: STATISTICALLY INDEPENDENT EVENTS

5) Saying that a set of events is collectively exhaustive implies that one of the events <u>must</u> occur.
Answer: TRUE
Diff: 2
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS

6) Saying that a set of events is mutually exclusive and collectively exhaustive implies that one and only one of the events can occur on any trial.
Answer: TRUE
Diff: 2
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS

7) A posterior probability is a revised probability.
Answer: TRUE
Diff: 2
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM

8) Bayes' theorem enables us to calculate the probability that one event takes place knowing that a second event has or has not taken place.
Answer: TRUE
Diff: 2
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM

Copyright © 2012 Pearson Education, Inc. publishing as Prentice Hall

9) A probability density function is a mathematical way of describing Bayes' theorem.
Answer: FALSE
Diff: 2
Topic: PROBABILITY DISTRIBUTIONS

10) The probability, *P*, of any event or state of nature occurring is greater than or equal to 0 and less than or equal to 1.
Answer: TRUE
Diff: 1
Topic: FUNDAMENTAL CONCEPTS

11) A probability is a numerical statement about the chance that an event will occur.
Answer: TRUE
Diff: 1
Topic: INTRODUCTION

12) If two events are mutually exclusive, the probability of both events occurring is simply the sum of the individual probabilities.
Answer: TRUE
Diff: 2
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS

13) Given two statistically dependent events (*A*,*B*), the conditional probability of $P(A|B) = P(B)/P(AB)$.
Answer: FALSE
Diff: 2
Topic: STATISTICALLY DEPENDENT EVENTS

14) Given two statistically independent events (*A*,*B*), the joint probability of $P(AB) = P(A) + P(B)$.
Answer: FALSE
Diff: 2
Topic: STATISTICALLY INDEPENDENT EVENTS

15) Given three statistically independent events (*A*,*B*,*C*), the joint probability of $P(ABC) = P(A) \times P(B) \times P(C)$.
Answer: TRUE
Diff: 2
Topic: STATISTICALLY INDEPENDENT EVENTS

16) Given two statistically independent events (*A*,*B*), the conditional probability $P(A|B) = P(A)$.
Answer: TRUE
Diff: 2
Topic: STATISTICALLY INDEPENDENT EVENTS

17) Suppose that you enter a drawing by obtaining one of 20 tickets that have been distributed. By using the *classical method*, you can determine that the probability of your winning the drawing is 0.05.
Answer: TRUE
Diff: 2
Topic: FUNDAMENTAL CONCEPTS

18) Assume that you have a box containing five balls: two red and three white. You draw a ball two times, each time replacing the ball just drawn before drawing the next. The probability of drawing only one white ball is 0.20.
Answer: FALSE
Diff: 2
Topic: STATISTICALLY INDEPENDENT EVENTS
AACSB: Analytic Skills

19) If we roll a single die twice, the probability that the sum of the dots showing on the two rolls equals four (4), is 1/6.
Answer: FALSE
Diff: 3
Topic: STATISTICALLY INDEPENDENT EVENTS
AACSB: Analytic Skills

20) For two events A and B that are not mutually exclusive, the probability that either A or B will occur is $P(A) \times P(B) - P(A$ and $B)$.
Answer: FALSE
Diff: 2
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS

21) If we flip a coin three times, the probability of getting three heads is 0.125.
Answer: TRUE
Diff: 2
Topic: STATISTICALLY INDEPENDENT EVENTS
AACSB: Analytic Skills

22) Consider a standard 52-card deck of cards. The probability of drawing either a seven or a black card is 7/13.
Answer: TRUE
Diff: 2
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS
AACSB: Analytic Skills

23) If a bucket has three black balls and seven green balls, and we draw balls without replacement, the probability of drawing a green ball is independent of the number of balls previously drawn.
Answer: FALSE
Diff: 2
Topic: STATISTICALLY DEPENDENT EVENTS

24) Assume that you have an urn containing 10 balls of the following description:
4 are white (W) and lettered (L)
2 are white (W) and numbered (N)
3 are yellow (Y) and lettered (L)
1 is yellow (Y) and numbered (N)

If you draw a numbered ball (N), the probability that this ball is white (W) is 0.667.
Answer: TRUE
Diff: 2
Topic: STATISTICALLY DEPENDENT EVENTS

25) Assume that you have an urn containing 10 balls of the following description:
4 are white (W) and lettered (L)
2 are white (W) and numbered (N)
3 are yellow (Y) and lettered (L)
1 is yellow (Y) and numbered (N)

If you draw a numbered ball (N), the probability that this ball is white (W) is 0.60.
Answer: FALSE
Diff: 2
Topic: STATISTICALLY DEPENDENT EVENTS
AACSB: Analytic Skills

26) Assume that you have an urn containing 10 balls of the following description:
4 are white (W) and lettered (L)
2 are white (W) and numbered (N)
3 are yellow (Y) and lettered (L)
1 is yellow (Y) and numbered (N)

If you draw a lettered ball (L), the probability that this ball is white (W) is 0.571.
Answer: TRUE
Diff: 2
Topic: STATISTICALLY DEPENDENT EVENTS
AACSB: Analytic Skills

27) The joint probability of two or more independent events occurring is the sum of their marginal or simple probabilities.
Answer: FALSE
Diff: 2
Topic: STATISTICALLY INDEPENDENT EVENTS

28) The number of bad checks written at a local store is an example of a discrete random variable.
Answer: TRUE
Diff: 2
Topic: RANDOM VARIABLES
AACSB: Reflective Thinking

29) Given the following distribution:

Outcome	Value of Random Variable	Probability
A	1	.4
B	2	.3
C	3	.2
D	4	.1

The expected value is 3.
Answer: FALSE

Diff: 2
Topic: PROBABILITY DISTRIBUTIONS
AACSB: Analytic Skills

30) A new young executive is perplexed at the number of interruptions that occur due to employee relations. She has decided to track the number of interruptions that occur during each hour of her day. Over the last month, she has determined that between 0 and 3 interruptions occur during any given hour of her day. The data is shown below.

Number of Interruptions in 1 hour	Probability
0 interruption	.5
1 interruptions	.3
2 interruptions	.1
3 interruptions	.1

On average, she should expect 0.8 interruptions per hour.
Answer: TRUE
Diff: 2
Topic: PROBABILITY DISTRIBUTIONS
AACSB: Analytic Skills

31) A new young executive is perplexed at the number of interruptions that occur due to employee relations. She has decided to track the number of interruptions that occur during each hour of her day. Over the last month, she has determined that between 0 and 3 interruptions occur during any given hour of her day. The data is shown below.

Number of Interruptions in 1 hour	Probability
0 interruption	.4
1 interruptions	.3
2 interruptions	.2
3 interruptions	.1

On average, she should expect 1.0 interruptions per hour.
Answer: TRUE
Diff: 2
Topic: PROBABILITY DISTRIBUTIONS
AACSB: Analytic Skills

32) The *expected value* of a binomial distribution is expressed as np, where n equals the number of trials and p equals the probability of success of any individual trial.
Answer: TRUE
Diff: 2
Topic: THE BINOMIAL DISTRIBUTION

33) The standard deviation equals the square of the variance.
Answer: FALSE
Diff: 2
Topic: PROBABILITY DISTRIBUTIONS

34) The probability of obtaining specific outcomes in a Bernoulli process is described by the binomial probability distribution.
Answer: TRUE
Diff: 2
Topic: THE BINOMIAL DISTRIBUTION

35) The variance of a binomial distribution is expressed as $np/(1-p)$, where n equals the number of trials and p equals the probability of success of any individual trial.
Answer: FALSE
Diff: 2
Topic: THE BINOMIAL DISTRIBUTION

36) The F distribution is a continuous probability distribution that is helpful in testing hypotheses about variances.
Answer: TRUE
Diff: 2
Topic: THE F DISTRIBUTION

37) The mean and standard deviation of the Poisson distribution are equal.
Answer: FALSE
Diff: 2
Topic: THE POISSON DISTRIBUTION

38) In a normal distribution the Z value represents the number of standard deviations from a value X to the mean.
Answer: TRUE
Diff: 2
Topic: THE NORMAL DISTRIBUTION

39) Assume you have a normal distribution representing the likelihood of completion times. The mean of this distribution is 10, and the standard deviation is 3. The probability of completing the project in 8 or fewer days is the same as the probability of completing the project in 18 days or more.
Answer: FALSE
Diff: 2
Topic: THE NORMAL DISTRIBUTION
AACSB: Analytic Skills

40) Assume you have a normal distribution representing the likelihood of completion times. The mean of this distribution is 10, and the standard deviation is 3. The probability of completing the project in 7 or fewer days is the same as the probability of completing the project in 13 days or more.
Answer: TRUE
Diff: 2
Topic: THE NORMAL DISTRIBUTION
AACSB: Analytic Skills

41) The classical method of determining probability is
A) subjective probability.
B) marginal probability.
C) objective probability.
D) joint probability.
E) conditional probability.
Answer: C
Diff: 2
Topic: FUNDAMENTAL CONCEPTS

42) Subjective probability assessments depend on
A) the total number of trials.
B) the relative frequency of occurrence.
C) the number of occurrences of the event.
D) experience and judgment.
E) None of the above
Answer: D
Diff: 1
Topic: FUNDAMENTAL CONCEPTS

43) If two events are mutually exclusive, then
A) their probabilities can be added.
B) they may also be collectively exhaustive.
C) the joint probability is equal to 0.
D) if one occurs, the other cannot occur.
E) All of the above
Answer: E
Diff: 2
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS and STATISTICALLY
INDEPENDENT EVENTS

44) A _____ is a numerical statement about the likelihood that an event will occur.
A) mutually exclusive construct
B) collectively exhaustive construct
C) variance
D) probability
E) standard deviation
Answer: D
Diff: 1
Topic: INTRODUCTION

45) A conditional probability $P(B|A)$ is equal to its marginal probability P(B) if
A) it is a joint probability.
B) statistical dependence exists.
C) statistical independence exists.
D) the events are mutually exclusive.
E) $P(A) = P(B)$.
Answer: C
Diff: 2

Topic: STATISTICALLY INDEPENDENT EVENTS

46) The equation $P(A|B) = P(AB)/P(B)$ is
A) the marginal probability.
B) the formula for a conditional probability.
C) the formula for a joint probability.
D) only relevant when events A and B are collectively exhaustive.
E) None of the above
Answer: B
Diff: 2
Topic: STATISTICALLY DEPENDENT EVENTS

47) Suppose that we determine the probability of a warm winter based on the number of warm winters experienced over the past 10 years. In this case, we have used _____.
A) relative frequency
B) the classical method
C) the logical method
D) subjective probability
E) None of the above
Answer: A
Diff: 1
Topic: FUNDAMENTAL CONCEPTS

48) Bayes' theorem is used to calculate
A) revised probabilities.
B) joint probabilities.
C) prior probabilities.
D) subjective probabilities.
E) marginal probabilities.
Answer: A
Diff: 2
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM

49) If the sale of ice cream and pizza are independent, then as ice cream sales decrease by 60 percent during the winter months, pizza sales will
A) increase by 60 percent.
B) increase by 40 percent.
C) decrease by 60 percent.
D) decrease by 40 percent.
E) be unrelated.
Answer: E
Diff: 2
Topic: STATISTICALLY INDEPENDENT EVENTS

50) If $P(A) = 0.3$, $P(B) = 0.2$, $P(A$ and $B) = 0.0$, what can be said about events A and B?
A) They are independent.
B) They are mutually exclusive.
C) They are posterior probabilities.
D) None of the above
E) All of the above
Answer: B
Diff: 2
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS

51) Suppose that 10 golfers enter a tournament and that their respective skill levels are approximately the same. What is the probability that one of the first three golfers that registered for the tournament will win?
A) 0.100
B) 0.001
C) 0.300
D) 0.299
E) 0.700
Answer: C
Diff: 1
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS
AACSB: Analytic Skills

52) Suppose that 10 golfers enter a tournament and that their respective skill levels are approximately the same. Six of the entrants are female and two of those are older than 40 years old. Three of the men are older than 40 years old. What is the probability that the winner will be either female or older than 40 years old?
A) 0.000
B) 1.100
C) 0.198
D) 0.200
E) 0.900
Answer: E
Diff: 2
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS
AACSB: Analytic Skills

53) Suppose that 10 golfers enter a tournament and that their respective skill levels are approximately the same. Six of the entrants are female and two of those are older than 40 years old. Three of the men are older than 40 years old. What is the probability that the winner will be a female who is older than 40 years old?
A) 0.000
B) 1.100
C) 0.198
D) 0.200
E) 0.900
Answer: D
Diff: 2
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS
AACSB: Analytic Skills

54) "The probability of event B, given that event A has occurred" is known as a _____ probability.
A) continuous
B) marginal
C) simple
D) joint
E) conditional
Answer: E
Diff: 1
Topic: STATISTICALLY INDEPENDENT EVENTS

55) When does $P(A|B) = P(A)$?
A) when A and B are mutually exclusive
B) when A and B are statistically independent
C) when A and B are statistically dependent
D) when A and B are collectively exhaustive
E) when $P(B) = 0$
Answer: B
Diff: 2
Topic: STATISTICALLY INDEPENDENT EVENTS

56) A consulting firm has received 2 Super Bowl playoff tickets from one of its clients. To be fair, the firm is randomly selecting two different employee names to "win" the tickets. There are 6 secretaries, 5 consultants and 4 partners in the firm. Which of the following statements is not true?
A) The probability of a secretary winning a ticket on the first draw is 6/15.
B) The probability of a secretary winning a ticket on the second draw given that a consultant won a ticket on the first draw is 6/15.
C) The probability of a consultant winning a ticket on the first draw is 1/3.
D) The probability of two secretaries winning both tickets is 1/7.
E) The probability of a partner winning a ticket on the second draw given that a secretary won a ticket on the first draw is 4/14.
Answer: B
Diff: 3
Topic: STATISTICALLY DEPENDENT EVENTS
AACSB: Analytic Skills

57) A consulting firm has received 2 Super Bowl playoff tickets from one of its clients. To be fair, the firm is randomly selecting two different employee names to "win" the tickets. There are 6 secretaries, 5 consultants, and 4 partners in the firm. Which of the following statements is true?
A) The probability of a partner winning on the second draw given that a partner won on the first draw is 3/14.
B) The probability of a secretary winning on the second draw given that a secretary won on the first draw is 2/15.
C) The probability of a consultant winning on the second draw given that a consultant won on the first draw is 5/14.
D) The probability of a partner winning on the second draw given that a secretary won on the first draw is 8/30.
E) None of the above are true.
Answer: A
Diff: 2
Topic: STATISTICALLY DEPENDENT EVENTS
AACSB: Analytic Skills

58) A consulting firm has received 2 Super Bowl playoff tickets from one of its clients. To be fair, the firm is randomly selecting two different employee names to "win" the tickets. There are 6 secretaries, 5 consultants, and 4 partners in the firm. Which of the following statements is true?
A) The probability of two secretaries winning is the same as the probability of a secretary winning on the second draw given that a consultant won on the first draw.
B) The probability of a secretary and a consultant winning is the same as the probability of a secretary and secretary winning.
C) The probability of a secretary winning on the second draw given that a consultant won on the first draw is the same as the probability of a consultant winning on the second draw given that a secretary won on the first draw.
D) The probability that both tickets will be won by partners is the same as the probability that a consultant and secretary will win.
E) None of the above are true.
Answer: E
Diff: 3
Topic: STATISTICALLY DEPENDENT EVENTS
AACSB: Analytic Skills

59) At a university with 1,000 business majors, there are 200 business students enrolled in an introductory statistics course. Of these 200 students, 50 are also enrolled in an introductory accounting course. There are an additional 250 business students enrolled in accounting but not enrolled in statistics. If a business student is selected at random, what is the probability that the student is either enrolled in accounting or statistics, but not both?
A) 0.45
B) 0.50
C) 0.40
D) 0.05
E) None of the above
Answer: C
Diff: 3
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS and STATISTICALLY DEPENDENT EVENTS
AACSB: Analytic Skills

60) At a university with 1,000 business majors, there are 200 business students enrolled in an introductory statistics course. Of these 200 students, 50 are also enrolled in an introductory accounting course. There are an additional 250 business students enrolled in accounting but not enrolled in statistics. If a business student is selected at random, what is the probability that the student is enrolled in accounting?
A) 0.20
B) 0.25
C) 0.30
D) 0.50
E) None of the above
Answer: C
Diff: 2
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS
AACSB: Analytic Skills

61) At a university with 1,000 business majors, there are 200 business students enrolled in an introductory statistics course. Of these 200 students, 50 are also enrolled in an introductory accounting course. There are an additional 250 business students enrolled in accounting but not enrolled in statistics. If a business student is selected at random, what is the probability that the student is enrolled in statistics?
A) 0.05
B) 0.20
C) 0.25
D) 0.30
E) None of the above
Answer: B
Diff: 1
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS
AACSB: Analytic Skills

62) At a university with 1,000 business majors, there are 200 business students enrolled in an introductory statistics course. Of these 200 students, 50 are also enrolled in an introductory accounting course. There are an additional 250 business students enrolled in accounting but not enrolled in statistics. If a business student is selected at random, what is the probability that the student is enrolled in both statistics and accounting?
A) 0.05
B) 0.06
C) 0.20
D) 0.25
E) None of the above
Answer: A
Diff: 2
Topic: STATISTICALLY DEPENDENT EVENTS
AACSB: Analytic Skills

63) At a university with 1,000 business majors, there are 200 business students enrolled in an introductory statistics course. Of these 200 students, 50 are also enrolled in an introductory accounting course. There are an additional 250 business students enrolled in accounting but not enrolled in statistics. If a business student is selected at random and found to be enrolled in statistics, what is the probability that the student is also enrolled in accounting?
A) 0.05
B) 0.30
C) 0.20
D) 0.25
E) None of the above
Answer: D
Diff: 2
Topic: STATISTICALLY DEPENDENT EVENTS
AACSB: Analytic Skills

64) Suppose that when the temperature is between 35 and 50 degrees, it has historically rained 40% of the time. Also, historically, the month of April has had a temperature between 35 and 50 degrees on 25 days. You have scheduled a golf tournament for April 12. What is the probability that players will experience rain and a temperature between 35 and 50 degrees?
A) 0.333
B) 0.400
C) 0.833
D) 1.000
E) 0.480
Answer: A
Diff: 2
Topic: STATISTICALLY DEPENDENT EVENTS
AACSB: Analytic Skills

65) Suppose that, historically, April has experienced rain and a temperature between 35 and 50 degrees on 20 days. Also, historically, the month of April has had a temperature between 35 and 50 degrees on 25 days. You have scheduled a golf tournament for April 12. If the temperature is between 35 and 50 degrees on that day, what will be the probability that the players will get wet?
A) 0.333
B) 0.667
C) 0.800
D) 1.000
E) 0.556
Answer: C
Diff: 2
Topic: STATISTICALLY DEPENDENT EVENTS
AACSB: Analytic Skills

66) At a university with 1,000 business majors, there are 200 business students enrolled in an introductory statistics course. Of these 200, 50 are also enrolled in an introductory accounting course. There are an additional 250 business students enrolled in accounting but not enrolled in statistics. If a business student is selected at random, what is the probability that the student is enrolled in neither accounting nor statistics?
A) 0.45
B) 0.50
C) 0.55
D) 0.05
E) None of the above
Answer: C
Diff: 3
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS and STATISTICALLY DEPENDENT EVENTS
AACSB: Analytic Skills

67) At a university with 1,000 business majors, there are 200 business students enrolled in an introductory statistics course. Of these 200, 50 are also enrolled in an introductory accounting course. There are an additional 250 business students enrolled in accounting but not enrolled in statistics. If a business student is selected at random, what is the probability that the student is not enrolled in accounting?
A) 0.20
B) 0.25
C) 0.30
D) 0.50
E) None of the above
Answer: E
Diff: 2
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS
AACSB: Analytic Skills

68) At a university with 1,000 business majors, there are 200 business students enrolled in an introductory statistics course. Of these 200, 50 are also enrolled in an introductory accounting course. There are an additional 250 business students enrolled in accounting but not enrolled in statistics. If a business student is selected at random, what is the probability that the student is not enrolled in statistics?
A) 0.05
B) 0.20
C) 0.25
D) 0.80
E) None of the above
Answer: D
Diff: 2
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS
AACSB: Analytic Skills

69) A production process is known to produce a particular item in such a way that 5 percent of these are defective. If two items are randomly selected as they come off the production line, what is the probability that the second item will be defective?
A) 0.05
B) 0.005
C) 0.18
D) 0.20
E) None of the above
Answer: A
Diff: 2
Topic: STATISTICALLY INDEPENDENT EVENTS
AACSB: Analytic Skills

70) A production process is known to produce a particular item in such a way that 5 percent of these are defective. If two items are randomly selected as they come off the production line, what is the probability that both are defective (assuming that they are independent)?
A) 0.0100
B) 0.1000
C) 0.2000
D) 0.0025
E) 0.0250
Answer: D
Diff: 2
Topic: STATISTICALLY INDEPENDENT EVENTS
AACSB: Analytic Skills

71) A company is considering producing some new Gameboy electronic games. Based on past records, management believes that there is a 70 percent chance that each of these will be successful and a 30 percent chance of failure. Market research may be used to revise these probabilities. In the past, the successful products were predicted to be successful based on market research 90 percent of the time. However, for products that failed, the market research predicted these would be successes 20 percent of the time. If market research is performed for a new product, what is the probability that the results indicate a successful market for the product and the product is actually not successful?
A) 0.63
B) 0.06
C) 0.07
D) 0.24
E) 0.27
Answer: B
Diff: 2
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
AACSB: Analytic Skills

72) A company is considering producing some new Gameboy electronic games. Based on past records, management believes that there is a 70 percent chance that each of these will be successful and a 30 percent chance of failure. Market research may be used to revise these probabilities. In the past, the successful products were predicted to be successful based on market research 90 percent of the time. However, for products that failed, the market research predicted these would be successes 20 percent of the time. If market research is performed for a new product, what is the probability that the results indicate an unsuccessful market for the product and the product is actually successful?
A) 0.63
B) 0.06
C) 0.07
D) 0.24
E) 0.21
Answer: C
Diff: 2
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
AACSB: Analytic Skills

73) A company is considering producing some new Gameboy electronic games. Based on past records, management believes that there is a 70 percent chance that each of these will be successful and a 30 percent chance of failure. Market research may be used to revise these probabilities. In the past, the successful products were predicted to be successful based on market research 90 percent of the time. However, for products that failed, the market research predicted these would be successes 20 percent of the time. If market research is performed for a new product, what is the probability that the results indicate an unsuccessful market for the product and the product is actually unsuccessful?
A) 0.63
B) 0.06
C) 0.07
D) 0.24
E) 0.21
Answer: D
Diff: 2
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
AACSB: Analytic Skills

74) A company is considering producing some new Gameboy electronic games. Based on past records, management believes that there is a 70 percent chance that each of these will be successful, and a 30 percent chance of failure. Market research may be used to revise these probabilities. In the past, the successful products were predicted to be successful based on market research 90 percent of the time. However, for products that failed, the market research predicted these would be successes 20 percent of the time. If market research is performed for a new product, what is the probability that the product will be successful if the market research indicates a success?
A) 0.10
B) 0.90
C) 0.91
D) 0.63
E) 0.09
Answer: C
Diff: 3
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
AACSB: Analytic Skills

75) A dry cleaning business offers a pick-up and delivery service for a 10 percent surcharge. Management believes 60 percent of customers will take advantage of this service. They are also considering offering customers the option of opening an account and receiving monthly bills. They believe 60 percent of their customers (regardless of whether or not they use the pick-up service) will use the account service. If the two services are introduced to the market, what is the probability a customer uses both services?
A) 0.12
B) 0.60
C) 0.36
D) 0.24
E) None of the above
Answer: C
Diff: 2
Topic: STATISTICALLY INDEPENDENT EVENTS
AACSB: Analytic Skills

76) A dry cleaning business offers a pick-up and delivery service for a 10 percent surcharge. Management believes 60 percent of the existing customers will take advantage of this service. They are also considering offering customers the option of opening an account and receiving monthly bills. They believe 60 percent of customers (regardless of whether or not they use the pick-up service) will use the account service. If the two services are introduced to the market, what is the probability that a customer uses only one of these services?
A) 0.40
B) 0.60
C) 0.48
D) 0.24
E) None of the above
Answer: C
Diff: 2
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS and STATISTICALLY DEPENDENT EVENTS
AACSB: Analytic Skills

77) A dry cleaning business offers a pick-up and delivery service for a 10 percent surcharge. Management believes 60 percent of the existing customers will take advantage of this service. They are also considering offering customers the option of opening an account and receiving monthly bills. They believe 60 percent of customers (regardless of whether or not they use the pick-up service) will use the account service. If the two services are introduced to the market, what is the probability a customer uses neither of these services?
A) 0.16
B) 0.24
C) 0.80
D) 0.36
E) None of the above
Answer: A
Diff: 2
Topic: STATISTICALLY INDEPENDENT EVENTS
AACSB: Analytic Skills

78) A company is considering producing some new Gameboy electronic games. Based on past records, management believes that there is a 70 percent chance that each of these will be successful and a 30 percent chance of failure. Market research may be used to revise these probabilities. In the past, the successful products were predicted to be successful based on market research 90 percent of the time. However, for products that failed, the market research predicted these would be successes 20 percent of the time. If market research is performed for a new product, what is the probability that the product will be successful if the market research indicates a failure?
A) 0.20
B) 0.90
C) 0.91
D) 0.63
E) 0.23
Answer: E
Diff: 3
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
AACSB: Analytic Skills

79) Which distribution is helpful in testing hypotheses about variances?
A) binomial distribution
B) *F* distribution
C) normal distribution
D) Poisson distribution
E) exponential distribution
Answer: B
Diff: 2
Topic: THE F DISTRIBUTION

80) A company is considering producing two new electronic games designed for the popular Gameboy toy. Based on market data, management believes there is a 60 percent chance that a "cops and robbers" game will be successful and a 40 percent chance that a "let's play house" game will be successful. As these products are completely different, it may be assumed that the success of one is totally independent of the success of the other. If two products are introduced to the market, what is the probability that both are successful?
A) 0.12
B) 0.60
C) 0.36
D) 0.24
E) None of the above
Answer: D
Diff: 2
Topic: STATISTICALLY INDEPENDENT EVENTS
AACSB: Analytic Skills

81) A company is considering producing two new electronic games designed for the popular Gameboy toy. Based on market data, management believes that there is a 60 percent chance that a "cops and robbers" game will be successful and a 40 percent chance that "let's play house" game will be successful. As these products are completely different, it may be assumed that the success of one is totally independent of the success of the other. If two products are introduced to the market, what is the probability that both are failures?
A) 0.16
B) 0.24
C) 0.80
D) 0.36
E) None of the above
Answer: B
Diff: 2
Topic: STATISTICALLY INDEPENDENT EVENTS
AACSB: Analytic Skills

82) A company is considering producing some new Gameboy electronic games. Based on past records, management believes that there is a 70 percent chance that each of these will be successful and a 30 percent chance of failure. Market research may be used to revise these probabilities. In the past, the successful products were predicted to be successful based on market research 90 percent of the time. However, for products that failed, the market research predicted these would be successes 20 percent of the time. If market research is performed for a new product, what is the probability that the results indicate a successful market for the product and the product actually is successful?

A) 0.90
B) 0.54
C) 0.60
D) 0.63
E) None of the above
Answer: D
Diff: 2
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
AACSB: Analytic Skills

83) The expected value of a probability distribution is
A) the measure of the spread of the distribution.
B) the variance of the distribution.
C) the average value of the distribution.
D) the probability density function.
E) the range of continuous values from point A to point B, inclusive.
Answer: C
Diff: 1
Topic: PROBABILITY DISTRIBUTIONS

84) Which of the following is not true for discrete random variables?
A) The expected value is the weighted average of the values.
B) They can assume only a countable number of values.
C) The probability of each value of the random variable must be 0.
D) The probability values always sum up to 1.
E) A binomial random variable is considered discrete.
Answer: C
Diff: 2
Topic: PROBABILITY DISTRIBUTIONS

85) The number of phone calls coming into a switchboard in the next five minutes will either be 0, 1, or 2. The probabilities are the same for each of these (1/3). If X is the number of calls arriving in a five-minute time period, what is the mean of X?
A) 1/3
B) 2/3
C) 1
D) 4/3
E) None of the above
Answer: C
Diff: 2
Topic: PROBABILITY DISTRIBUTIONS
AACSB: Analytic Skills

86) The number of phone calls coming into a switchboard in the next five minutes will either be 0, 1, 2, 3, 4, 5, or 6. The probabilities are the same for each of these (1/7). If X is the number of calls arriving in a five-minute time period, what is the mean of X?
A) 2
B) 3
C) 4
D) 5
E) None of the above
Answer: B
Diff: 2
Topic: PROBABILITY DISTRIBUTIONS
AACSB: Analytic Skills

87) A discrete random variable has a mean of 400 and a variance of 64. What is the standard deviation?
A) 64
B) 8
C) 20
D) 400
E) None of the above
Answer: B
Diff: 2
Topic: PROBABILITY DISTRIBUTIONS
AACSB: Analytic Skills

88) Which of the following is not true about continuous random variables?
A) They have an infinite set of values.
B) The area under each of the curves represents probabilities.
C) The entire area under each of the curves equals 1.
D) Some may be described by uniform distributions or exponential distributions.
E) They can only be integer values.
Answer: E
Diff: 2
Topic: PROBABILITY DISTRIBUTIONS

89) Historical data indicates that only 20% of cable customers are willing to switch companies. If a binomial process is assumed, then in a sample of 20 cable customers, what is the probability that exactly 2 customers would be willing to switch their cable?
A) 0.1
B) 0.04
C) 0.137
D) 0.206
E) 0.794
Answer: C
Diff: 3
Topic: THE BINOMIAL DISTRIBUTION
AACSB: Analytic Skills

90) Historical data indicates that only 20% of cable customers are willing to switch companies. If a binomial process is assumed, then in a sample of 20 cable customers, what is the probability that no more than 3 customers would be willing to switch their cable?
A) 0.85
B) 0.15
C) 0.20
D) 0.411
E) 0.589
Answer: D
Diff: 3
Topic: THE BINOMIAL DISTRIBUTION
AACSB: Analytic Skills

91) Properties of the normal distribution include
A) a continuous bell-shaped distribution.
B) a discrete probability distribution.
C) the number of trials is known and is either 1, 2, 3, 4, 5, etc.
D) the random variable can assume only a finite or limited set of values.
E) use in queuing.
Answer: A
Diff: 1
Topic: THE NORMAL DISTRIBUTION

92) Which of the following characteristics is true for a normal probability distribution?
A) The area under the curve is 1.
B) It is symmetrical.
C) The midpoint is also the mean.
D) Sixty-eight percent of the area under the curve lies within one standard deviation of the mean.
E) All of the above are true.
Answer: E
Diff: 2
Topic: THE NORMAL DISTRIBUTION

93) The number of cell phone minutes used by high school seniors follows a normal distribution with a mean of 500 and a standard deviation of 50. What is the probability that a student uses fewer than 600 minutes?
A) 0
B) 0.023
C) 0.841
D) 0.977
E) None of the above
Answer: D
Diff: 2
Topic: THE NORMAL DISTRIBUTION
AACSB: Analytic Skills

94) The number of cell phone minutes used by high school seniors follows a normal distribution with a mean of 500 and a standard deviation of 50. What is the probability that a student uses fewer than 400 minutes?
A) 0
B) 0.023
C) 0.159
D) 0.977
E) None of the above
Answer: B
Diff: 2
Topic: THE NORMAL DISTRIBUTION
AACSB: Analytic Skills

95) The number of cell phone minutes used by high school seniors follows a normal distribution with a mean of 500 and a standard deviation of 50. What is the probability that a student uses more than 350 minutes?
A) 0.001
B) 0.999
C) 0.618
D) 0.382
E) None of the above
Answer: B
Diff: 2
Topic: THE NORMAL DISTRIBUTION
AACSB: Analytic Skills

96) The number of cell phone minutes used by high school seniors follows a normal distribution with a mean of 500 and a standard deviation of 50. What is the probability that a student uses more than 580 minutes?
A) 0.152
B) 0.0548
C) 0.848
D) 0.903
E) None of the above
Answer: B
Diff: 2
Topic: THE NORMAL DISTRIBUTION
AACSB: Analytic Skills

97) Data for a particular subdivision near downtown Houston indicate that the average price per square foot for a home is $100 with a standard deviation of $5 (normally distributed). What is the probability that the average price per square foot for a home is greater than $110?
A) 0
B) 0.023
C) 0.841
D) 0.977
E) None of the above
Answer: B
Diff: 2
Topic: THE NORMAL DISTRIBUTION
AACSB: Analytic Skills

98) Data for a particular subdivision near downtown Houston indicate that the average price per square foot for a home is $100 with a standard deviation of $5 (normally distributed). What is the probability that the average price per square foot for a home is greater than $90?
A) 0
B) 0.023
C) 0.159
D) 0.977
E) None of the above
Answer: D
Diff: 2
Topic: THE NORMAL DISTRIBUTION
AACSB: Analytic Skills

99) Data for a particular subdivision near downtown Houston indicate that the average price per square foot for a home is $100 with a standard deviation of $5 (normally distributed). What is the probability that the average price per square foot for a home is less than $85?
A) 0.001
B) 0.999
C) 0.618
D) 0.382
E) None of the above
Answer: A
Diff: 2
Topic: THE NORMAL DISTRIBUTION
AACSB: Analytic Skills

100) Data for a particular subdivision near downtown Houston indicate that the average price per square foot for a home is $100 with a standard deviation of $5 (normally distributed). What is the probability that the average price per square foot for a home is less than $108?
A) 0.152
B) 0.097
C) 0.848
D) 0.945
E) None of the above
Answer: D
Diff: 2
Topic: THE NORMAL DISTRIBUTION
AACSB: Analytic Skills

101) The time required to complete a project is normally distributed with a mean of 80 weeks and a standard deviation of 10 weeks. The construction company must pay a penalty if the project is not finished by the due date in the contract. If a construction company bidding on this contract puts in a due date of 80 weeks, what is the probability that they will have to pay a penalty?
A) 0
B) 1.000
C) 0.500
D) 1/8
E) None of the above
Answer: C
Diff: 2
Topic: THE NORMAL DISTRIBUTION
AACSB: Analytic Skills

102) The time required to complete a project is normally distributed with a mean of 80 weeks and a standard deviation of 10 weeks. The construction company must pay a penalty if the project is not finished by the due date in the contract. If a construction company bidding on this contract wishes to be 90 percent sure of finishing by the due date, what due date (project week #) should be negotiated?
A) 81.28
B) 92.8
C) 81.82
D) .81954
E) None of the above
Answer: B
Diff: 2
Topic: THE NORMAL DISTRIBUTION
AACSB: Analytic Skills

103) The time required to travel downtown at 10 a.m. on Monday morning is known to be normally distributed with a mean of 40 minutes and a standard deviation of 5 minutes. What is the probability that it will take less than 40 minutes?
A) 0.50
B) 0.20
C) 0.80
D) 1.00
E) None of the above
Answer: A
Diff: 2
Topic: THE NORMAL DISTRIBUTION
AACSB: Analytic Skills

104) The time required to travel downtown at 10 a.m. on Monday morning is known to be normally distributed with a mean of 40 minutes and a standard deviation of 5 minutes. What is the probability that it will take less than 35 minutes?
A) 0.84134
B) 0.15866
C) 0.53983
D) 0.46017
E) None of the above
Answer: B
Diff: 2
Topic: THE NORMAL DISTRIBUTION
AACSB: Analytic Skills

105) The time required to travel downtown at 10 a.m. on Monday morning is known to be normally distributed with a mean of 40 minutes and a standard deviation of 5 minutes. What is the probability that it will take more than 40 minutes?
A) 0.2500
B) 0.0625
C) 1.000
D) 0.5000
E) None of the above
Answer: D
Diff: 2
Topic: THE NORMAL DISTRIBUTION
AACSB: Analytic Skills

106) Queuing Theory makes use of the
A) normal probability distribution.
B) uniform probability distribution.
C) binomial probability distribution.
D) Poisson probability distribution.
E) None of the above
Answer: D
Diff: 2
Topic: THE POISSON DISTRIBUTION

107) The number of cars passing through an intersection in the next five minutes can usually be described by the
A) normal distribution.
B) uniform distribution.
C) exponential distribution.
D) Poisson distribution.
E) None of the above
Answer: D
Diff: 2
Topic: THE POISSON DISTRIBUTION

108) Arrivals at a fast-food restaurant follow a Poisson distribution with a mean arrival rate of 16 customers per hour. What is the probability that in the next hour there will be exactly 12 arrivals?
A) 0.0000
B) 0.0661
C) 0.7500
D) 0.1322
E) None of the above
Answer: B
Diff: 3
Topic: THE POISSON DISTRIBUTION
AACSB: Analytic Skills

109) Arrivals at a fast-food restaurant follow a Poisson distribution with a mean arrival rate of 16 customers per hour. What is the probability that in the next hour there will be exactly 8 arrivals?
A) 1.000
B) 0.200
C) 0.175
D) 0.825
E) None of the above
Answer: E
Diff: 3
Topic: THE POISSON DISTRIBUTION
AACSB: Analytic Skills

110) Which of the following statements concerning the F distribution is true?
A) The F distribution is discrete.
B) The F distribution is symmetrical.
C) The F distribution is useful in modeling customer arrivals.
D) The F distribution is useful in testing hypotheses about variance.
E) The F distribution is interchangeable with the normal distribution for large sample sizes.
Answer: D
Diff: 2
Topic: THE F DISTRIBUTION

111) What is the F value associated with $\alpha = 0.05$, numerator degrees of freedom (df_1) equal to 4, and denominator degrees of freedom (df_2) equal to 9?
A) 3.63
B) 1.80
C) 6.0
D) 0.11
E) 0.18
Answer: A
Diff: 2
Topic: THE F DISTRIBUTION

112) Which of the following characteristics is <u>not</u> true for the exponential distribution?
A) It is discrete probability distribution.
B) It is also called the negative exponential distribution.
C) It is used in dealing with queuing problems.
D) It is used to describe the times between customer arrivals.
E) The variance is the square of the expected value.
Answer: A
Diff: 2
Topic: THE EXPONENTIAL DISTRIBUTION

113) The length of time that it takes the tollbooth attendant to service each driver can typically be described by the
A) normal distribution.
B) uniform distribution.
C) exponential distribution.
D) Poisson distribution.
E) None of the above
Answer: C
Diff: 2
Topic: THE EXPONENTIAL DISTRIBUTION

114) The Department of Motor Vehicles (DMV) can service customers at a rate of 20 per hour (or 1/3 per minute) when it comes to license renewals. The service time follows an exponential distribution. What is the probability that it will take less than 2 minutes for a particular customer to get a license renewal?
A) 1
B) 0.487
C) 0.513
D) 0
E) 0.1
Answer: B
Diff: 3
Topic: THE EXPONENTIAL DISTRIBUTION
AACSB: Analytic Skills

115) The Department of Motor Vehicles (DMV) can service customers at a rate of 20 per hour (or 1/3 per minute) when it comes to license renewals. The service time follows an exponential distribution. What is the probability that it will take less than 3 minutes for a particular customer to get a license renewal?
A) 0.5
B) 0
C) 1
D) 0.368
E) 0.632
Answer: E
Diff: 3
Topic: THE EXPONENTIAL DISTRIBUTION
AACSB: Analytic Skills

116) Drivers arrive at a toll booth at a rate of 3 per minute during peak traffic periods. The time between consecutive driver arrivals follows an exponential distribution. What is the probability that takes less than 1/2 of a minute between consecutive drivers?
A) 0.167
B) 0.223
C) 0.777
D) 0.5
E) 1
Answer: C
Diff: 3
Topic: THE EXPONENTIAL DISTRIBUTION
AACSB: Analytic Skills

117) Drivers arrive at a toll booth at a rate of 3 per minute during peak traffic periods. The time between consecutive driver arrivals follows an exponential distribution. What is the probability that takes more than 1/3 of a minute between consecutive drivers?
A) 0.632
B) 0.111
C) 0.368
D) 0.632
E) Not enough information given
Answer: C
Diff: 3
Topic: THE EXPONENTIAL DISTRIBUTION
AACSB: Analytic Skills

118) An urn contains 7 blue and 3 yellow chips. If the drawing of chips is done with replacement, determine the probability of:
(a)   drawing three yellow chips.
(b)   drawing a blue chip on the first draw and a yellow chip on the second draw.
(c)   drawing a blue chip on the second draw given that a yellow chip was drawn on the first draw.
(d)   drawing a yellow chip on the second draw given that a blue chip was drawn on the first draw.
(e)   drawing a yellow chip on the second draw given that a yellow chip was drawn on the first draw.
Answer: (a) 0.027 (b) 0.210 (c) 0.700 (d) 0.300 (e) 0.300
Diff: 2
Topic: STATISTICALLY INDEPENDENT EVENTS
AACSB: Analytic Skills

119) A market research study is being conducted to determine if a product modification will be well received by the public. A total of 1,000 consumers are questioned regarding this product.
The table below provides information regarding this sample.

	Positive Reaction	Neutral Reaction	Negative Reaction
Male	240	60	100
Female	260	220	120

(a)   What is the probability that a randomly selected male would find this change unfavorable (negative)?
(b)   What is the probability that a randomly selected person would be a female who had a positive reaction?
(c)   If it is known that a person had a negative reaction to the study, what is the probability that the person is male?
Answer: (a) 100/400 = 0.25 (b) 260/1000 = 0.260 (c) 100/220 = 0.4545
Diff: 2
Topic: STATISTICALLY DEPENDENT EVENTS
AACSB: Analytic Skills

120) In a production run of 300 units, there are exactly 20 defective items and 280 good items.
(a)   What is the probability that a randomly selected item is defective?
(b)   If two items are sampled without replacement, what is the probability that both are good?
(c)   If two items are randomly sampled without replacement, what is the probability that the first is good but the second is defective?
Answer: (a) 20/300 = 0.067 (b) (280/300)(279/299) = 0.871 (c) (280/300)(20/299) = 0.062
Diff: 2
Topic: STATISTICALLY DEPENDENT EVENTS
AACSB: Analytic Skills

121) A new television program was viewed by 200 people (120 females and 80 males). Of the females, 60 liked the program and 60 did not. Of the males, 60 of the 80 liked the program.
(a)   What is the probability that a randomly selected individual liked the program?
(b)   If a male in this group is selected, what is the probability that he liked the program?
(c)   What is the probability that a randomly selected individual is a female and liked the program?
Answer: (a) 120/200 = 0.60 (b) 60/80 = 0.75 (c) 60/200 = 0.30
Diff: 2
Topic: STATISTICALLY DEPENDENT EVENTS
AACSB: Analytic Skills

122) Colonel Motors (an automobile company) has prepared a marketing campaign for its best selling car. The focus of the campaign is quality, and it is claimed that 97 percent of the purchasers of this car have no complaints in the first year. You and your sister Kim have each purchased one of these cars.
(a)   What is the probability that neither of you has a complaint about the car in the first year if the advertising claim is true?
(b)   What is the probability that exactly one of you has a complaint about the car in the first year if the advertising claim is true?
Answer: (a) 0.97(0.97) = 0.9409 (b) 0.03(0.97) + 0.97(0.03) = 0.0582
Diff: 2
Topic: STATISTICALLY INDEPENDENT EVENTS

123) A local "home TV repair service" company has two repairmen who make all of the home repairs. The company sends Repairman D on 70 percent of all jobs, because the likelihood of a "second follow-up call" within a week is only 0.08 compared to 0.20 for Repairman K. If you had a recent repair job that is going to require a second follow-up call, what is the probability that Repairman K did your initial repair work?
Answer: P(K|2nd) = 0.06/(.06+.056) = 0.517
Diff: 3
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
AACSB: Analytic Skills

124) Our department store is having a sale on personal computers, of which three are in stock (no rain checks). There is a certain probability of selling none. The probability of selling one is twice as great as the probability of selling none. The probability of selling two is three times the probability of selling none. Finally, the probability of selling all the personal computers is four times as great as the probability of selling none. In a table, list the outcomes and their probabilities. Hint: Let the probability of selling none equal x.
Answer:

Outcome	Probability
Sell 0	0.1
Sell 1	0.2
Sell 2	0.3
Sell 3	0.4

Diff: 2
Topic: PROBABILITY DISTRIBUTIONS
AACSB: Analytic Skills

125) ABC Manufacturing has 6 machines that perform a particular task. Breakdowns occur frequently for this machine. Past records indicate that the number of breakdowns that occur each day is described by the following probability distribution:

Number of Breakdowns	Probability
0	0.4
1	0.3
2	0.2
3	0.1
More than 3	0.0

(a) What is the expected number of breakdowns in any given day?
(b) What is the variance for this distribution?
(c) What is the probability that there will be at least 2 breakdowns in a day?
Answer:
(a) expected value = 1.0
(b) variance = 1(.4) + 0(.3) + 1(.2) + 4(.1) = 1.0
(c) P(2 or more) = 0.2 + 0.1 = 0.3
Diff: 2
Topic: PROBABILITY DISTRIBUTIONS
AACSB: Analytic Skills

126) Fast Service Store has maintained daily sales records on the various size "Cool Drink" sales.

"Cool Drink" Price	Number Sold
$0.50	75
$0.75	120
$1.00	125
$1.25	80
Total	400

Assuming that past performance is a good indicator of future sales,
(a)   what is the probability of a customer purchasing a $1.00 "Cool Drink?"
(b)   what is the probability of a customer purchasing a $1.25 "Cool Drink?"
(c)   what is the probability of a customer purchasing a "Cool Drink" that costs greater than or equal to $1.00?
(d)   what is the expected value of a "Cool Drink"?
(e)   what is the variance of a "Cool Drink"?
Answer:
(a) 125/400 = 0.3125 (b) 80/400 = 0.20 (c) 205/400 = 0.5125
(d) .5(.1875) + .75(.3) + 1(.3125) + 1.25(.2) = .88125 (e) 0.064
Diff: 3
Topic: PROBABILITY DISTRIBUTIONS
AACSB: Analytic Skills

127) In a given office, the color printer breaks down with a probability of 20% in any month. A binomial process is assumed for a period of 10 months.
(a) What is the probability that the printer breaks down exactly 2 times?
(b) What is the probability that the printer breaks down at most 1 time?
(c) What is the probability that the printer breaks down more than once?
Answer:
(a) P(r=2) = 0.3020 (b) P(r≤1) = 0.3758 (c) P(r>1) = 0.6242
Diff: 3
Topic: THE BINOMIAL DISTRIBUTION
AACSB: Analytic Skills

128) A southwestern tourist city has records indicating that the average daily temperature in the summer is 82 degrees F, which is normally distributed with a standard deviation of 3 degrees F. Based on these records, determine:
(a) the probability of a daily temperature between 79 degrees F and 85 degrees F.
(b) the probability that the daily temperature exceeds 90 degrees F.
(c) the probability that the daily temperature is below 76 degrees F.
Answer:
(a) P(79<X<85) = 0.68268 (b) P(X>90) = 0.00383 (c) P(X<76) = 0.02275
Diff: 2
Topic: THE NORMAL DISTRIBUTION
AACSB: Analytic Skills

129) Using the table for finding the areas under normal curves, find the area under a normal curve with a mean of 200 and a standard deviation of 10 between the values of:
(a) 200 to 205.
(b) 195 to 205.
(c) 200 to 215.
(d) 195 to 215.
(e) 186.5 to 217.
Answer:
(a) 0.19146 (b) 0.38293 (c) 0.43319 (d) 0.62466 (e) 0.86693
Diff: 3
Topic: THE NORMAL DISTRIBUTION
AACSB: Analytic Skills

130) The time required to complete a project is known to be normally distributed with a mean of 44 weeks and a standard deviation of 8 weeks.
(a) What is the probability that the project is finished in 40 weeks or fewer?
(b) What is the probability that the project is finished in 52 weeks or fewer?
(c) There is an 95 percent chance that the project will be finished in fewer than how many weeks?
Answer:
(a) 0.30854 (b) 0.84135 (c) $44 + 1.645(8) = 57.16$
Diff: 2
Topic: THE NORMAL DISTRIBUTION
AACSB: Analytic Skills

131) Compute the F value based on the following:
(a) $df_1 = 2$, $df_2 = 4$, $\alpha = 0.01$
(b) $df_1 = 3$ $df_2 = 6$, $\alpha = 0.05$
Answer:
(a) 18 (b) 4.76
Diff: 2
Topic: THE F DISTRIBUTION

132) A call center receives calls from customers at a rate of 2 per min. The time between customer calls follows an exponential distribution.
(a)   What is the probability that it takes 1/3 of a minute or less between consecutive customer calls?
(b) What is the probability that it take 1/2 of a minute or more between consecutive customer calls?
Answer:
(a) 0.487 (b) 0.368
Diff: 3
Topic: THE EXPONENTIAL DISTRIBUTION
AACSB: Analytic Skills

133) Arrivals in a university advising office during the week of registration are known to follow a Poisson distribution with an average of 4 people arriving each hour.
(a) What is the probability that exactly 4 people will arrive in the next hour?
(b) What is the probability that exactly 5 people will arrive in the next hour?
Answer:
(a) $P(X=4) = 0.1954$ (b) $P(X=5) = 0.1563$
Diff: 3
Topic: THE POISSON DISTRIBUTION
AACSB: Analytic Skills

134) Explain why event probabilities range from 0 to 1.
Answer: The number 0 represents no chance of occurrence, while 1 represents a 100 percent chance of occurrence. Any number between 0 and 1 represents that particular event's chance of occurrence. Any negative number or number exceeding 1 has no meaning for an event probability.
Diff: 2
Topic: FUNDAMENTAL CONCEPTS
AACSB: Reflective Thinking

135) Using a standard deck of 52 cards, explain why the situation of drawing a 7 and a club is not collectively exhaustive.
Answer: It is possible to draw other cards that are non-clubs and also not a 7.
Diff: 2
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS

136) Name five common probability distributions.
Answer: Answers could vary, but may include: binomial, normal, F, exponential, and Poisson.
Diff: 2
Topic: VARIOUS

137) If two events (A,B) are mutually exclusive, what is the probability of event A or event B occurring?
Answer: $P(A \text{ or } B) = P(A) + P(B)$
Diff: 2
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS

138) If two events (A,B) are not mutually exclusive, what is the probability of event A or event B occurring?
Answer: $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$
Diff: 2
Topic: MUTUALLY EXCLUSIVE AND COLLECTIVELY EXHAUSTIVE EVENTS

139) If two events (A,B) are independent, what is their joint probability?
Answer: $P(AB) = P(A) \times P(B)$
Diff: 2
Topic: STATISTICALLY INDEPENDENT EVENTS

140) If two events (A,B) are dependent, what is the conditional probability of $P(A|B)$?
Answer: $P(A|B) = P(AB)|P(B)$
Diff: 2
Topic: STATISTICALLY DEPENDENT EVENTS

141) If two events (*A*,*B*) are independent, then the conditional probability of $P(A|B) =$ _____.
Answer: $P(A)$
Diff: 2
Topic: STATISTICALLY INDEPENDENT EVENTS

142) Explain what a discrete random variable is.
Answer: A discrete random variable has a probability value assigned to each event. These values must be between 0 and 1, and they must sum to 1.
Diff: 2
Topic: PROBABILITY DISTRIBUTIONS

143) The exponential distribution often describes _____.
Answer: the time required to service a customer
Diff: 2
Topic: THE EXPONENTIAL DISTRIBUTION

144) List the two parameters of the normal distribution.
Answer: mean (μ) and standard deviation (σ)
Diff: 2
Topic: THE NORMAL DISTRIBUTION

145) In what way is the *F* distribution often used?
Answer: It is helpful in testing hypotheses about variances.
Diff: 2
Topic: THE F DISTRIBUTION

146) List the parameter(s) of the Poisson distribution.
Answer: the mean and the variance λ
Diff: 2
Topic: THE POISSON DISTRIBUTION