

Quantitative Analysis for Management, 12e (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: FUNDAMENTAL CONCEPTS

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: FUNDAMENTAL CONCEPTS

5) Saying that a set of events is collectively exhaustive implies that one of the events must occur.

Answer: TRUE

Diff: 2

Topic: FUNDAMENTAL CONCEPTS

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: FUNDAMENTAL CONCEPTS

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

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: FUNDAMENTAL CONCEPTS

13) Given two statistically dependent events (A,B) , the conditional probability of $P(A|B) = P(B)/P(AB)$.

Answer: FALSE

Diff: 2

Topic: FUNDAMENTAL CONCEPTS

14) Given two statistically independent events (A,B) , the joint probability of $P(AB) = P(A) + P(B)$.

Answer: FALSE

Diff: 2

Topic: FUNDAMENTAL CONCEPTS

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: FUNDAMENTAL CONCEPTS

16) Given two statistically independent events (A,B) , the conditional probability $P(A|B) = P(A)$.

Answer: TRUE

Diff: 2

Topic: FUNDAMENTAL CONCEPTS

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: FUNDAMENTAL CONCEPTS

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: FUNDAMENTAL CONCEPTS

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 $P(A) \times P(B) - P(A \text{ and } B)$.

Answer: FALSE

Diff: 2

Topic: FUNDAMENTAL CONCEPTS

21) If we flip a coin three times, the probability of getting three heads is 0.125.

Answer: TRUE

Diff: 2

Topic: FUNDAMENTAL CONCEPTS

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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

23) Although one revision of prior probabilities can provide useful posterior probability estimates, additional information can be gained from performing the experiment a second time.

Answer: TRUE

Diff: 2

Topic: FURTHER PROBABILITY REVISIONS

24) 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: FUNDAMENTAL CONCEPTS

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 0.667.

Answer: TRUE

Diff: 2

Topic: FUNDAMENTAL CONCEPTS

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 numbered ball (N), the probability that this ball is white (W) is 0.60.

Answer: FALSE

Diff: 2

Topic: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

27) 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

28) The joint probability of two or more independent events occurring is the sum of their marginal or simple probabilities.

Answer: FALSE

Diff: 2

Topic: FUNDAMENTAL CONCEPTS

29) 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

30) 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

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	.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

32) 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

33) 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

34) The standard deviation equals the square of the variance.

Answer: FALSE

Diff: 2

Topic: PROBABILITY DISTRIBUTIONS

35) 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

36) 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

37) The F distribution is a continuous probability distribution that is helpful in testing hypotheses about variances.

Answer: TRUE

Diff: 2

Topic: THE F DISTRIBUTION

38) The mean and standard deviation of the Poisson distribution are equal.

Answer: FALSE

Diff: 2

Topic: THE POISSON DISTRIBUTION

39) 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

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 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

41) The F statistic is the ratio of two sample standard deviations from independent normal distributions.

Answer: FALSE

Diff: 2

Topic: THE F DISTRIBUTION

42) 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

43) 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

44) 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

45) 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: FUNDAMENTAL CONCEPTS

46) 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

47) 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: FUNDAMENTAL CONCEPTS

48) 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: FUNDAMENTAL CONCEPTS

49) 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

50) 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

51) 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: FUNDAMENTAL CONCEPTS

52) If $P(A) = 0.3$, $P(B) = 0.2$, $P(A \text{ and } B) = 0.0$, 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: FUNDAMENTAL CONCEPTS

53) 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

54) 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

55) 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

56) "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: FUNDAMENTAL CONCEPTS

57) 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: FUNDAMENTAL CONCEPTS

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 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

59) 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

60) 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: FUNDAMENTAL CONCEPTS

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 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: FUNDAMENTAL CONCEPTS

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 accounting?

- A) 0.20
- B) 0.25
- C) 0.30
- D) 0.50
- E) None of the above

Answer: C

Diff: 2

Topic: FUNDAMENTAL CONCEPTS

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, 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

64) 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

65) 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

66) 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

67) 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: FUNDAMENTAL CONCEPTS

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 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 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

69) 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 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

70) 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 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

71) 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

72) 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: FUNDAMENTAL CONCEPTS

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 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

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 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

75) 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

76) 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

77) 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

78) 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

79) 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

80) 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

81) Which distribution is helpful in testing hypotheses about variances?

- A) binomial distribution
- B) distribution
- C) normal distribution
- D) Poisson distribution
- E) exponential distribution

Answer: B

Diff: 2

Topic: THE F DISTRIBUTION

82) 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 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

83) 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 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 failures?

- A) 0.16
- B) 0.24
- C) 0.80
- D) 0.36
- E) None of the above

Answer: B

Diff: 2

Topic: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

84) 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

85) 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

86) 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

87) 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

88) 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

89) 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

90) 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

91) 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

92) 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

93) 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 between 2 and 5 (inclusive) customers are willing to switch companies?

- A) 0.1369
- B) 0.1746
- C) 0.0377
- D) 0.7350
- E) 0.500

Answer: D

Diff: 3

Topic: THE BINOMIAL DISTRIBUTION

AACSB: Analytic Skills

94) 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

95) 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 $\pm$ one standard deviation of the mean.
- E) All of the above are true.

Answer: E

Diff: 2

Topic: THE NORMAL DISTRIBUTION

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 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

97) 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

98) 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

99) 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

100) 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 between 400 and 500 minutes?

- A) 0.4773
- B) 0.05228
- C) 0.0228
- D) 0.9773
- E) None of the above

Answer: A

Diff: 3

Topic: THE NORMAL DISTRIBUTION

AACSB: Analytic Skills

101) 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

102) 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

103) 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

104) 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

105) 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

106) 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

107) 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

108) 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

109) 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

110) 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

111) 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

112) 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

113) 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

114) The number of calls received by call center follows a Poisson process with a rate of 1.5 per minute. What is the probability that a minute goes by without a call?

- A) 0
- B) 0.223
- C) 0.500
- D) 0.558
- E) 1

Answer: B

Diff: 2

Topic: THE POISSON DISTRIBUTION

AACSB: Analytic Skills

115) 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

116) 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

117) Given a $df_1 = 3$ and $df_2 = 6$, what is the probability that F is greater than 4.3?

- A) 0.0610
- B) 0.1294
- C) 0.05
- D) 0.5
- E) Not enough information provided

Answer: A

Diff: 2

Topic: THE F DISTRIBUTION

118) What is the probability that F is between 4 and 5, given a $df_1 = 4$ and $df_2 = 6$?

- A) 0.0654
- B) 0.0406
- C) 0.0248
- D) 0.05
- E) Not enough information provided

Answer: C

Diff: 3

Topic: THE F DISTRIBUTION

119) Which of the following characteristics is not 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

120) 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

121) 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

122) 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

123) 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 between 2 and 3 minutes to be served?

- A) 0.4831
- B) 0
- C) 1
- D) 0.1419
- E) 0.6284

Answer: D

Diff: 3

Topic: THE EXPONENTIAL DISTRIBUTION

AACSB: Analytic Skills

124) 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 it will take 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

125) 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 it will take more than 1/3 of a minute between consecutive drivers?

- A) 0.632
- B) 0.111
- C) 0.368
- D) 0.208
- E) Not enough information given

Answer: C

Diff: 3

Topic: THE EXPONENTIAL DISTRIBUTION

AACSB: Analytic Skills

126) 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

127) 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

128) 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

129) 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

130) 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

131) 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

132) 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

133) 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) $P(2 \text{ or more}) = 0.2 + 0.1 = 0.3$

Diff: 2

Topic: PROBABILITY DISTRIBUTIONS

AACSB: Analytic Skills

134) 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

135) 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) $P(r \leq 1) = 0.3758$ (c) $P(r > 1) = 0.6242$

Diff: 3

Topic: THE BINOMIAL DISTRIBUTION

AACSB: Analytic Skills

136) 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

137) 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

138) The number of defects that occur per unit of product follows a Poisson distribution with a mean of 4 defects per unit. What is the standard deviation of this distribution?

Answer: 2

Diff: 2

Topic: THE POISSON DISTRIBUTION

AACSB: Analytic Skills

139) 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 a 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

140) Machine breakdowns occur at a rate of 0.4 per week. The time between breakdowns follows an exponential distribution. What is the probability that more than 2 weeks go by without a breakdown?

Answer: 0.4493

Diff: 3

Topic: THE EXPONENTIAL DISTRIBUTION

AACSB: Analytic Skills

141) 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

AACSB: Analytic Skills

142) For $df_1 = 3$ and $df_2 = 7$, what is the probability that F is greater than 5?

Answer: 0.0367

Diff: 2

Topic: THE F DISTRIBUTION

AACSB: Analytic Skills

143) For $df_1 = 4$ and $df_2 = 5$, what is the probability that F is greater than 4.5?

Answer: 0.06515

Diff: 2

Topic: THE F DISTRIBUTION

AACSB: Analytic Skills

144) 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 takes 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

145) Customer arrivals occur at a rate of 1.2 per minute. The time between customer arrivals follows an exponential distribution. What is the probability that it takes between 1 and 2 minutes between customer arrivals?

Answer: 0.2105

Diff: 3

Topic: THE EXPONENTIAL DISTRIBUTION

AACSB: Analytic Skills

146) 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

147) 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

148) 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: FUNDAMENTAL CONCEPTS

149) 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

150) 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

151) If two events (A, B) are independent, what is their joint probability?

Answer: $P(AB) = P(A) \times P(B)$

Diff: 2

Topic: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

152) 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: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

153) If two events (A,B) are independent, then the conditional probability of $P(A|B) = \underline{\hspace{2cm}}$.

Answer: $P(A)$

Diff: 2

Topic: FUNDAMENTAL CONCEPTS

AACSB: Analytic Skills

154) 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

155) The exponential distribution often describes .

Answer: the time required to service a customer

Diff: 2

Topic: THE EXPONENTIAL DISTRIBUTION

156) List the two parameters of the normal distribution.

Answer: mean (μ) and standard deviation (σ)

Diff: 2

Topic: THE NORMAL DISTRIBUTION

157) In what way is the F distribution often used?

Answer: It is helpful in testing hypotheses about variances.

Diff: 2

Topic: THE F DISTRIBUTION

158) List the parameter(s) of the Poisson distribution.

Answer: the mean and the variance λ

Diff: 2

Topic: THE POISSON DISTRIBUTION