Test Bank for Quantitative Analysis for Management 13th Render

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Quantitative Analysis for Management, 13e **(Render et al.)**
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: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Concept

2) Mutually exclusive events exist if only one of the events can occur on any one trial.
Answer: TRUE
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Concept

3) 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: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Concept

4) Saying that a set of events is collectively exhaustive implies that one of the events must occur.
Answer: TRUE
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Concept

5) 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: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Concept

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6) A posterior probability is a revised probability.
Answer: TRUE
Diff: Moderate
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
Classification: Concept

7) 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: Moderate
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
Classification: Concept

8) A probability density function is a mathematical way of describing Bayes' theorem.
Answer: FALSE
Diff: Moderate
Topic: PROBABILITY DISTRIBUTIONS
LO: 2.5: Explain the difference between discrete and continuous probability distributions.
AACSB: Analytical thinking
Classification: Concept

9) If two events are mutually exclusive, the probability of both events occurring is simply the sum of the individual probabilities.
Answer: TRUE
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Concept

10) Given two statistically dependent events (A,B), the conditional probability of $P(A|B) = P(B)/P(AB)$.
Answer: FALSE
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Concept

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11) Given two statistically independent events (A,B), the joint probability of $P(AB) = P(A) + P(B)$.
Answer: FALSE
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Concept

12) Given two statistically independent events (A,B), the conditional probability $P(A|B) = P(A)$.
Answer: TRUE
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Concept

13) 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: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

14) 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: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

15) 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: Difficult
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

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16) 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: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

17) 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: Moderate
Topic: FURTHER PROBABILITY REVISIONS
LO: 2.3: Use Bayes' Theorem to establish further probability revisions.
AACSB: Analytical thinking
Classification: Concept

18) The joint probability of two or more independent events occurring is the sum of their marginal or simple probabilities.
Answer: FALSE
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Concept

19) The number of bad checks written at a local store is an example of a discrete random variable.
Answer: TRUE
Diff: Moderate
Topic: RANDOM VARIABLES
LO: 2.4: Describe and provide examples of both discrete and continuous random variables.
AACSB: Application of knowledge
Classification: Concept

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20) 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: Moderate
Topic: PROBABILITY DISTRIBUTIONS
LO: 2.5: Explain the difference between discrete and continuous probability distributions.
AACSB: Analytical thinking
Classification: Application

21) 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: Moderate
Topic: PROBABILITY DISTRIBUTIONS
LO: 2.5: Explain the difference between discrete and continuous probability distributions.
AACSB: Analytical thinking
Classification: Application

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22) 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: Moderate
Topic: PROBABILITY DISTRIBUTIONS
LO: 2.5: Explain the difference between discrete and continuous probability distributions.
AACSB: Analytical thinking
Classification: Application

23) 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: Moderate
Topic: THE BINOMIAL DISTRIBUTION
LO: 2.6: Understand the binomial distribution.
AACSB: Analytical thinking
Classification: Concept

24) The standard deviation equals the square of the variance.
Answer: FALSE
Diff: Moderate
Topic: PROBABILITY DISTRIBUTIONS
LO: 2.5: Explain the difference between discrete and continuous probability distributions.
AACSB: Analytical thinking
Classification: Concept

25) The probability of obtaining specific outcomes in a Bernoulli process is described by the binomial probability distribution.
Answer: TRUE
Diff: Moderate
Topic: THE BINOMIAL DISTRIBUTION
LO: 2.6: Understand the binomial distribution.
AACSB: Analytical thinking
Classification: Concept

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26) 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: Moderate
Topic: THE BINOMIAL DISTRIBUTION
LO: 2.6: Understand the binomial distribution.
AACSB: Analytical thinking
Classification: Concept

27) The F distribution is a continuous probability distribution that is helpful in testing hypotheses about variances.
Answer: TRUE
Diff: Moderate
Topic: THE F DISTRIBUTION
LO: 2.8: Understand the F distribution
AACSB: Analytical thinking
Classification: Concept

28) The mean and standard deviation of the Poisson distribution are equal.
Answer: FALSE
Diff: Moderate
Topic: THE POISSON DISTRIBUTION
LO: 2.10: Understand the Poisson distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Concept

29) In a normal distribution, the Z value represents the number of standard deviations from a value X to the mean.
Answer: TRUE
Diff: Moderate
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Concept

30) 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: Moderate
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Application

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31) The *F* statistic is the ratio of two sample standard deviations from independent normal distributions.
Answer: FALSE
Diff: Moderate
Topic: THE F DISTRIBUTION
LO: 2.8: Understand the F distribution
AACSB: Analytical thinking
Classification: Concept

32) 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: Moderate
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Application

33) 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.
Answer: D
Diff: Easy
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Concept

34) 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.
Answer: C
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Concept

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35) 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.
Answer: A
Diff: Easy
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Concept

36) Bayes' theorem is used to calculate
A) revised probabilities.
B) joint probabilities.
C) prior probabilities.
D) subjective probabilities.
Answer: A
Diff: Moderate
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
Classification: Concept

37) 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 40 percent.
D) be unrelated.
Answer: D
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

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38) 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) They are collectively exhaustive.
Answer: B
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

39) 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
Answer: C
Diff: Easy
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

40) Suppose that 10 sophomores enter a belching contest and that their respective skill levels are approximately the same. Six of the entrants are female and two of those are engineering majors. Three of the men are engineers. What is the probability that the winner will be either female or majoring in something other than engineering?
A) 0.10
B) 0.30
C) 0.70
D) 0.90
Answer: C
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

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41) Suppose that 10 sophomores enter a belching contest and that their respective skill levels are approximately the same. Six of the entrants are female and two of those are engineering majors. Three of the men are engineers. What is the probability that the winner will be a male engineering major?
A) 0.10
B) 0.30
C) 0.70
D) 0.90
Answer: B
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

42) Suppose that 10 sophomores enter a belching contest and that their respective skill levels are approximately the same. Six of the entrants are female and two of those are engineering majors. Three of the men are engineers. What is the probability that the winner will be either a non-engineering major or a male?
A) 0.20
B) 0.40
C) 0.60
D) 0.80
Answer: D
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

43) "The probability of event *B*, given that event *A* has occurred" is known as a _____ probability.
A) continuous
B) marginal
C) simple
D) conditional
Answer: D
Diff: Easy
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Concept

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44) 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
Answer: B
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Concept

45) 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.
Answer: B
Diff: Difficult
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

46) 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.
Answer: A
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

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47) 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
Answer: C
Diff: Difficult
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

48) 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
Answer: C
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

49) 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
Answer: B
Diff: Easy
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

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50) 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
Answer: A
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

51) 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
Answer: D
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

52) 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) 0.480
Answer: A
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

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53) 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
Answer: C
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

54) 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
Answer: C
Diff: Difficult
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

55) 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
Answer: D
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

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56) 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
Answer: A
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

57) 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
Answer: D
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

58) 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
Answer: B
Diff: Moderate
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
Classification: Application

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59) 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
Answer: C
Diff: Moderate
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
Classification: Application

60) 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
Answer: D
Diff: Moderate
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
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61) 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
Answer: C
Diff: Difficult
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
Classification: Application

62) 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
Answer: C
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

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63) 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
Answer: C
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

64) 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
Answer: A
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

65) Which distribution is helpful in testing hypotheses about variances?
A) binomial distribution
B) distribution
C) normal distribution
D) Poisson distribution
Answer: B
Diff: Moderate
Topic: THE F DISTRIBUTION
LO: 2.8: Understand the F distribution
AACSB: Analytical thinking
Classification: Concept

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66) 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
Answer: D
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

67) 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
Answer: B
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

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68) 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
Answer: D
Diff: Moderate
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
Classification: Application

69) 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.
Answer: C
Diff: Easy
Topic: PROBABILITY DISTRIBUTIONS
LO: 2.5: Explain the difference between discrete and continuous probability distributions.
AACSB: Analytical thinking
Classification: Concept

70) Which of the following is <u>not</u> 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.
Answer: C
Diff: Moderate
Topic: PROBABILITY DISTRIBUTIONS
LO: 2.5: Explain the difference between discrete and continuous probability distributions.
AACSB: Analytical thinking
Classification: Concept

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71) 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
Answer: C
Diff: Moderate
Topic: PROBABILITY DISTRIBUTIONS
LO: 2.5: Explain the difference between discrete and continuous probability distributions.
AACSB: Analytical thinking
Classification: Application

72) 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
Answer: B
Diff: Moderate
Topic: PROBABILITY DISTRIBUTIONS
LO: 2.5: Explain the difference between discrete and continuous probability distributions.
AACSB: Analytical thinking
Classification: Application

73) 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
Answer: B
Diff: Moderate
Topic: PROBABILITY DISTRIBUTIONS
LO: 2.5: Explain the difference between discrete and continuous probability distributions.
AACSB: Analytical thinking
Classification: Application

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74) 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) They can only be integer values.
Answer: D
Diff: Moderate
Topic: PROBABILITY DISTRIBUTIONS
LO: 2.5: Explain the difference between discrete and continuous probability distributions.
AACSB: Analytical thinking
Classification: Concept

75) 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
Answer: C
Diff: Difficult
Topic: THE BINOMIAL DISTRIBUTION
LO: 2.6: Understand the binomial distribution.
AACSB: Analytical thinking
Classification: Application

76) 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
Answer: D
Diff: Difficult
Topic: THE BINOMIAL DISTRIBUTION
LO: 2.6: Understand the binomial distribution.
AACSB: Analytical thinking
Classification: Application

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77) 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
Answer: D
Diff: Difficult
Topic: THE BINOMIAL DISTRIBUTION
LO: 2.6: Understand the binomial distribution.
AACSB: Analytical thinking
Classification: Application

78) 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.
Answer: A
Diff: Easy
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Concept

79) 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
Answer: D
Diff: Moderate
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Application

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80) 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
Answer: B
Diff: Moderate
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Application

81) 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
Answer: B
Diff: Moderate
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Application

82) 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
Answer: B
Diff: Moderate
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Application

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83) 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
Answer: A
Diff: Difficult
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Application

84) 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
Answer: B
Diff: Moderate
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Application

85) 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
Answer: D
Diff: Moderate
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Application

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86) 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
Answer: A
Diff: Moderate
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Application

87) 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
Answer: D
Diff: Moderate
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Application

88) 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
Answer: C
Diff: Moderate
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Application

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89) 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
Answer: B
Diff: Moderate
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Application

90) 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
Answer: A
Diff: Moderate
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Application

91) 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
Answer: B
Diff: Moderate
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Application

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92) 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
Answer: D
Diff: Moderate
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Application

93) Queuing Theory makes use of the
A) normal probability distribution.
B) uniform probability distribution.
C) binomial probability distribution.
D) Poisson probability distribution.
Answer: D
Diff: Moderate
Topic: THE POISSON DISTRIBUTION
LO: 2.10: Understand the Poisson distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Concept

94) 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.
Answer: D
Diff: Moderate
Topic: THE POISSON DISTRIBUTION
LO: 2.10: Understand the Poisson distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Concept

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95) 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
Answer: B
Diff: Difficult
Topic: THE POISSON DISTRIBUTION
LO: 2.10: Understand the Poisson distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Application

96) 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: Moderate
Topic: THE POISSON DISTRIBUTION
LO: 2.10: Understand the Poisson distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Application

97) 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.
Answer: D
Diff: Moderate
Topic: THE F DISTRIBUTION
LO: 2.8: Understand the F distribution
AACSB: Analytical thinking
Classification: Concept

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98) 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
Answer: A
Diff: Moderate
Topic: THE F DISTRIBUTION
LO: 2.8: Understand the F distribution
AACSB: Analytical thinking
Classification: Application

99) 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
Answer: A
Diff: Moderate
Topic: THE F DISTRIBUTION
LO: 2.8: Understand the F distribution
AACSB: Analytical thinking
Classification: Application

100) 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
Answer: C
Diff: Difficult
Topic: THE F DISTRIBUTION
LO: 2.8: Understand the F distribution
AACSB: Analytical thinking
Classification: Application

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101) 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.
Answer: A
Diff: Moderate
Topic: THE EXPONENTIAL DISTRIBUTION
LO: 2.9: Understand the exponential distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Concept

102) 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.
Answer: C
Diff: Moderate
Topic: THE EXPONENTIAL DISTRIBUTION
LO: 2.9: Understand the exponential distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Concept

103) 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
Answer: B
Diff: Difficult
Topic: THE EXPONENTIAL DISTRIBUTION
LO: 2.9: Understand the exponential distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Application

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104) 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
Answer: D
Diff: Difficult
Topic: THE EXPONENTIAL DISTRIBUTION
LO: 2.9: Understand the exponential distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Application

105) 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
Answer: D
Diff: Difficult
Topic: THE EXPONENTIAL DISTRIBUTION
LO: 2.9: Understand the exponential distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Application

106) 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
Answer: C
Diff: Difficult
Topic: THE EXPONENTIAL DISTRIBUTION
LO: 2.9: Understand the exponential distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Application

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107) 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
Answer: C
Diff: Difficult
Topic: THE EXPONENTIAL DISTRIBUTION
LO: 2.9: Understand the exponential distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Application

108) Which of these suggests a discrete random variable?
A) the exact time it takes to run a mile
B) the exact number of registered voters in your state
C) the exact amount of blood in a human body
D) the lifetime of a CF light bulb
Answer: B
Diff: Moderate
Topic: RANDOM VARIABLES
LO: 2.9: Understand the exponential distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Concept

109) Which of these suggests a continuous random variable?
A) the roll of a fair die
B) the number of dollar bills in your wallet
C) the number of parking permits issued at your school
D) the lifetime of an incandescent light bulb
Answer: D
Diff: Moderate
Topic: RANDOM VARIABLES
LO: 2.9: Understand the exponential distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Concept

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110) A random variable
A) is normally represented by an operator such as ≤ or ≥.
B) can be simultaneously continuous and discrete.
C) assigns a real number to every possible outcome or event in an experiment.
D) must represent only numerical values.
Answer: C
Diff: Moderate
Topic: RANDOM VARIABLES
LO: 2.9: Understand the exponential distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Concept

111) Disco Fever is randomly found in one half of one percent of the general population. Testing a swatch of clothing for the presence of polyester is 99% effective in detecting the presence of this disease. The test also yields a false-positive in 4% of the cases where the disease is not present. What is the probability that the disease is not present in any particular person?
A) 0.990
B) 0.960
C) 0.995
D) 0.950
Answer: C
Diff: Easy
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
Classification: Application

112) Disco Fever is randomly found in one half of one percent of the general population. Testing a swatch of clothing for the presence of polyester is 99% effective in detecting the presence of this disease. The test also yields a false-positive in 4% of the cases where the disease is not present. What is the probability that the disease is present if the test result comes back positive?
A) 0.1106
B) 0.8894
C) 0.9600
D) 0.0400
Answer: A
Diff: Moderate
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
Classification: Application

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113) Disco Fever is randomly found in one half of one percent of the general population. Testing a swatch of clothing for the presence of polyester is 99% effective in detecting the presence of this disease. The test also yields a false-positive in 4% of the cases where the disease is not present. What is the probability that the test result comes back positive if the disease is present?
A) 0.8894
B) 0.9500
C) 0.9600
D) 0.9900
Answer: A
Diff: Easy
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
Classification: Application

114) Disco Fever is randomly found in one half of one percent of the general population. Testing a swatch of clothing for the presence of polyester is 99% effective in detecting the presence of this disease. The test also yields a false-positive in 4% of the cases where the disease is not present. What is the probability that the test result comes back negative if the disease is present?
A) 0.89
B) 0.01
C) 0.96
D) 0.04
Answer: B
Diff: Easy
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
Classification: Application

115) Disco Fever is randomly found in one half of one percent of the general population. Testing a swatch of clothing for the presence of polyester is 99% effective in detecting the presence of this disease. The test also yields a false-positive in 4% of the cases where the disease is not present. What is the probability that the test result comes back negative regardless of whether the disease is present?
A) 0.9553
B) 0.8994
C) 0.9999
D) 0.9762
Answer: A
Diff: Moderate
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
Classification: Application

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116) Disco Fever is randomly found in one half of one percent of the general population. Testing a swatch of clothing for the presence of polyester is 99% effective in detecting the presence of this disease. The test also yields a false-positive in 4% of the cases where the disease is not present. What is the probability that the disease is absent if the test result is negative?
A) 0.9553
B) 0.8994
C) 0.9999
D) 0.9762
Answer: C
Diff: Moderate
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
Classification: Application

117) Disco Fever is randomly found in one half of one percent of the general population. Testing a swatch of clothing for the presence of polyester is 99% effective in detecting the presence of this disease. The test also yields a false-positive in 4% of the cases where the disease is not present. What is the probability that the test result is negative if the disease is absent?
A) 0.95
B) 0.96
C) 0.99
D) 0.995
Answer: B
Diff: Moderate
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
Classification: Application

118) Disco Fever is randomly found in one half of one percent of the general population. Testing a swatch of clothing for the presence of polyester is 99% effective in detecting the presence of this disease. The test also yields a false-positive in 4% of the cases where the disease is not present. What is the probability that the test result is positive if the disease is absent?
A) 0.01
B) 0.05
C) 0.055
D) 0.04
Answer: D
Diff: Moderate
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
Classification: Application

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119) Disco Fever is randomly found in one half of one percent of the general population. Testing a swatch of clothing for the presence of polyester is 99% effective in detecting the presence of this disease. The test also yields a false-positive in 4% of the cases where the disease is not present. What is the probability that the disease is not present if the test result is positive?
A) 0.8894
B) 0.9900
C) 0.9500
D) 0.9763
Answer: A
Diff: Moderate
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
Classification: Application

120) Disco Fever is randomly found in one half of one percent of the general population. Testing a swatch of clothing for the presence of polyester is 99% effective in detecting the presence of this disease. The test also yields a false-positive in 4% of the cases where the disease is not present. What is the probability that the disease is present if the test result is negative?
A) 0.005
B) 0.0001
C) 0.0010
D) 0.0005
Answer: B
Diff: Moderate
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
Classification: Application

121) Disco Fever is randomly found in one half of one percent of the general population. Testing a swatch of clothing for the presence of polyester is 99% effective in detecting the presence of this disease. The test also yields a false-positive in 4% of the cases where the disease is not present. What is the probability that the test result is positive?
A) 0.0056
B) 0.0523
C) 0.0448
D) 0.1106
Answer: C
Diff: Moderate
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
Classification: Application

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122) 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: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

123) 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: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

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124) 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: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

125) 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: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

126) 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: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

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127) 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: Difficult
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
Classification: Application

128) 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: Moderate
Topic: PROBABILITY DISTRIBUTIONS
LO: 2.5: Explain the difference between discrete and continuous probability distributions.
AACSB: Analytical thinking
Classification: Application

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129) 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: Moderate
Topic: PROBABILITY DISTRIBUTIONS
LO: 2.5: Explain the difference between discrete and continuous probability distributions.
AACSB: Analytical thinking
Classification: Application

130) 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: Difficult
Topic: PROBABILITY DISTRIBUTIONS
LO: 2.5: Explain the difference between discrete and continuous probability distributions.
AACSB: Analytical thinking
Classification: Application

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131) 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: Difficult
Topic: THE BINOMIAL DISTRIBUTION
LO: 2.6: Understand the binomial distribution.
AACSB: Analytical thinking
Classification: Application

132) 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: Moderate
Topic: THE POISSON DISTRIBUTION
LO: 2.10: Understand the Poisson distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Application

133) 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: Difficult
Topic: THE EXPONENTIAL DISTRIBUTION
LO: 2.9: Understand the exponential distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Application

134) 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: Moderate
Topic: THE F DISTRIBUTION
LO: 2.8: Understand the F distribution
AACSB: Analytical thinking
Classification: Application

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135) For $df_1 = 3$ and $df_2 = 7$, what is the probability that F is greater than 5?
Answer: 0.0367
Diff: Moderate
Topic: THE F DISTRIBUTION
LO: 2.8: Understand the F distribution
AACSB: Analytical thinking
Classification: Application

136) For $df_1 = 4$ and $df_2 = 5$, what is the probability that *F* is greater than 4.5?
Answer: 0.06515
Diff: Moderate
Topic: THE F DISTRIBUTION
LO: 2.8: Understand the F distribution
AACSB: Analytical thinking
Classification: Application

137) 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: Difficult
Topic: THE EXPONENTIAL DISTRIBUTION
LO: 2.9: Understand the exponential distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Application

138) 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: Difficult
Topic: THE EXPONENTIAL DISTRIBUTION
LO: 2.9: Understand the exponential distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Application

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139) 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: Difficult
Topic: THE POISSON DISTRIBUTION
LO: 2.10: Understand the Poisson distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Application

140) 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: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Reflective thinking
Classification: Application

141) 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: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

142) If two events (*A*,*B*) are mutually exclusive, what is the probability of event *A* or event *B* occurring?
Answer: P(A or B) = P(A) + P(B)
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Application

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143) If two events (*A*,*B*) are not mutually exclusive, what is the probability of event *A* or event *B* occurring?
Answer: P(A or B) = P(A) + P(B) - P(A and B)
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Concept

144) If two events (*A*,*B*) are independent, what is their joint probability?
Answer: P(AB) = P(A) × P(B)
Diff: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Concept

145) 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: Moderate
Topic: FUNDAMENTAL CONCEPTS
LO: 2.1: Understand the basic foundations of probability analysis.
AACSB: Analytical thinking
Classification: Concept

146) In what way is the *F* distribution often used?
Answer: It is helpful in testing hypotheses about variances.
Diff: Moderate
Topic: THE F DISTRIBUTION
LO: 2.8: Understand the F distribution
AACSB: Analytical thinking
Classification: Concept

147) What are the parameter(s) of the Poisson distribution? What is the ratio of these parameters?
Answer: The parameters are the mean and the variance λ; their ratio is 1.
Diff: Moderate
Topic: THE POISSON DISTRIBUTION
LO: 2.10: Understand the Poisson distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Concept

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148) What is the relationship between the exponential distribution and the Poisson distribution?
Answer: The exponential and Poisson distributions may be expressed as inverses of each other. If the number of occurrences per time period follows a Poisson distribution, then the time between those occurrences follows an exponential distribution.
Diff: Moderate
Topic: THE POISSON DISTRIBUTION
LO: 2.10: Understand the Poisson distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Concept

149) Disco Fever is randomly found in one half of one percent of the general population. Testing a swatch of clothing for the presence of polyester is 99% effective in detecting the presence of this disease. The test also yields a false-positive in 4% of the cases where the disease is not present. What is the probability that the disease is present if the test result is positive?
Answer: .1106
Diff: Moderate
Topic: REVISING PROBABILITIES WITH BAYES' THEOREM
LO: 2.2: Use Bayes' Theorem to establish posterior probabilities.
AACSB: Analytical thinking
Classification: Application

150) Customer arrivals are exponentially distributed and occur on average every 10 minutes. What is the standard deviation of customer interarrival times?
Answer: 3.162
Diff: Difficult
Topic: THE EXPONENTIAL DISTRIBUTION
LO: 2.9: Understand the exponential distribution and its relation to queuing theory.
AACSB: Analytical thinking
Classification: Application

151) For $df_1 = 34$ and $df_2 = 15$, what value of the F-statistic is required such that $P(F>f) = 0.1$?
Answer: 1.86
Diff: Moderate
Topic: THE F DISTRIBUTION
LO: 2.8: Understand the F distribution
AACSB: Analytical thinking
Classification: Application

152) For $df_1 = 34$ and $df_2 = 5$, what value of the F-statistic is required such that $P(F>f) = 0.001$?
Answer: 24.74
Diff: Moderate
Topic: THE F DISTRIBUTION
LO: 2.8: Understand the F distribution
AACSB: Analytical thinking
Classification: Application

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153) Michael's arms windmilled, propelling him through the water at a pace few could believe. He completed his 100 meter butterfly in 49.82 seconds and was pleased with his performance. At the ceremony later that afternoon, Michael and the other seven finalists were awarded participation medals, which he found distressing. He was quick to point out that the average time for the 100 meter butterfly was 53 seconds with a standard deviation of 0.9 seconds. There must be some way of demonstrating how exceptional his time was, so he turned to his friend who was studying quantitative analysis to help him prove this. How exceptional is Michael's performance?
Answer: The Z score for his 49.82 is -3.5333 and the probability of seeing a lower time is 0.000205.
Diff: Moderate
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Application

154) "It's 75 degrees and sunny here in San Diego this afternoon...," the weatherman droned on, repeating a phrase that probably should have been recorded and played on an endless loop. Tim looked at the previous year's high temperatures and noted that the average was 75 degrees with a standard deviation of 2.5 degrees and approximated a normal distribution. Armed with this evidence, determine:
(a) the probability of a daily temperature between 79 degrees F and 85 degrees F.
(b) the probability that the daily temperature exceeds 80 degrees F.
(c) the probability that the daily temperature is below 74 degrees F.
Answer: (a) $P(79 < X < 85) = 0.0547$ (b) $P(X > 80) = 0.02275$ (c) $P(X < 74) = 0.345$
Diff: Moderate
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Application

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155) An MBA director has decided to improve the profile of her program by admitting only the finest students. After an exhaustive search on the internet, she learns that combined GMAT scores average 550 with a standard deviation of 130.
(a) What cutoff score should she establish if she wants to consider only applicants scoring in the top 5%?
(b) If she uses 700 as her minimum score, what percentile can she claim for her incoming class' performance on the GMAT?
(c) If 1000 test takers apply, would she expect to find more students with scores in the range of 500 to 600 or in the range of 50 to 450? (Assume that applicants can actually score a 50 on the GMAT.)
Answer: (a) 95th percentile is 763 (b) a 700 is the 88th percentile (c) $P(500 < X < 600) = 0.299$, $P(50 < X < 450) = 0.221$ — she would expect 78 more applications in the 500 to 600 pile than in the 50 to 450 pile.
Diff: Moderate
Topic: THE NORMAL DISTRIBUTION
LO: 2.7: Understand the normal distribution and use the normal table.
AACSB: Analytical thinking
Classification: Application

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