Test Bank for Quantitative Methods for Business 13th Anderson

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Chapter 2 - Introduction to Probability

True / False

1. Two events that are independent cannot be mutually exclusive.
   a. True
   b. False

ANSWER: False
POINTS: 1
TOPICS: Basic relationships of probability

2. A joint probability can have a value greater than 1.
   a. True
   b. False

ANSWER: False
POINTS: 1
TOPICS: Introduction

3. The intersection of A and A^c is the entire sample space.
   a. True
   b. False

ANSWER: False
POINTS: 1
TOPICS: Basic relationships of probability

4. If 50 of 250 people contacted make a donation to the city symphony, then the relative frequency method assigns a probability of .2 to the outcome of making a donation.
   a. True
   b. False

ANSWER: True
POINTS: 1
TOPICS: Relative frequency method

5. An automobile dealership is waiting to take delivery of nine new cars. Today, anywhere from zero to all nine cars might be delivered. It is appropriate to use the classical method to assign a probability of 1/10 to each of the possible numbers that could be delivered.
   a. True
   b. False

ANSWER: False
POINTS: 1
TOPICS: Classical method

6. When assigning subjective probabilities, use experience, intuition, and any available data.
   a. True
   b. False

ANSWER: True
POINTS: 1

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TOPICS: Subjective method

7. P(A ∩ B) ≥ P(A)
   a. True
   b. False
ANSWER: False
POINTS: 1
TOPICS: Addition law

8. If P(A|B) = .4 and P(B) = .6, then P(A ∩ B) = .667.
   a. True
   b. False
ANSWER: False
POINTS: 1
TOPICS: Conditional probability

9. Bayes' theorem provides a way to transform prior probabilities into posterior probabilities.
   a. True
   b. False
ANSWER: True
POINTS: 1
TOPICS: Bayes' Theorem

10. If P(A ∪ B) = P(A) + P(B), then A and B are mutually exclusive.
   a. True
   b. False
ANSWER: True
POINTS: 1
TOPICS: Addition law

11. If A and B are mutually exclusive events, then P(A | B) = 0.
   a. True
   b. False
ANSWER: True
POINTS: 1
TOPICS: Mutually exclusive events

12. If A and B are independent events with P(A) = 0.1 and P(B) = 0.5, then P(A ∪ B) = .6.
   a. True
   b. False
ANSWER: False
POINTS: 1
TOPICS: Multiplication law for independent events

13. A graphical device used for enumerating sample points in a multiple-step experiment is a Venn diagram.

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a. True
b. False
ANSWER: False
POINTS: 1
TOPICS: Tree diagram

14. A posterior probability is a conditional probability.
a. True
b. False
ANSWER: True
POINTS: 1
TOPICS: Bayes' Theorem

15. If A and B are independent events, then $P(A \cap B) = P(A)P(B)$.
a. True
b. False
ANSWER: True
POINTS: 1
TOPICS: Multiplication law for independent events

16. Two events that are mutually exclusive cannot be independent.
a. True
b. False
ANSWER: True
POINTS: 1
TOPICS: Basic relationships of probability

17. $P(A|B) = P(B|A)$ for all events A and B.
a. True
b. False
ANSWER: False
POINTS: 1
TOPICS: Conditional probability

18. $P(A|B) = 1 - P(B|A)$ for all events A and B.
a. True
b. False
ANSWER: False
POINTS: 1
TOPICS: Conditional probability

19. $P(A|B) = P(A^C|B)$ for all events A and B.
a. True
b. False
ANSWER: True

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POINTS: 1
TOPICS: Conditional probability

20. $P(A|B) + P(A|B^C) = 1$ for all events A and B.
    a. True
    b. False
ANSWER: False
POINTS: 1
TOPICS: Conditional probability

Multiple Choice

21. Which of the following is <u>not</u> a valid representation of a probability?
    a. 35%
    b. 0
    c. 1.04
    d. 3/8
ANSWER: c
POINTS: 1
TOPICS: Introduction

22. A list of all possible outcomes of an experiment is called
    a. the sample space.
    b. the sample point.
    c. the experimental outcome.
    d. the likelihood set.
ANSWER: a
POINTS: 1
TOPICS: Sample space

23. Which of the following is <u>not</u> a proper sample space when all undergraduates at a university are considered?
    a. S = {in-state, out-of-state}
    b. S = {freshmen, sophomores}
    c. S = {age under 21, age 21 or over}
    d. S = {a major within business, no business major}
ANSWER: b
POINTS: 1
TOPICS: Sample space

24. In the set of all past due accounts, let the event A mean the account is between 31 and 60 days past due and the event B mean the account is that of a new customer. The complement of A is
    a. all new customers.
    b. all accounts fewer than 31 or more than 60 days past due.
    c. all accounts from new customers and all accounts that are from 31 to 60 days past due.
    d. all new customers whose accounts are between 31 and 60 days past due.

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ANSWER: b
POINTS: 1
TOPICS: Complement of an event

25. In the set of all past due accounts, let the event A mean the account is between 31 and 60 days past due and the event B mean the account is that of a new customer. The union of A and B is
a. all new customers.
b. all accounts fewer than 31 or more than 60 days past due.
c. all accounts from new customers and all accounts that are from 31 to 60 days past due.
d. all new customers whose accounts are between 31 and 60 days past due.

ANSWER: c
POINTS: 1
TOPICS: Addition law

26. In the set of all past due accounts, let the event A mean the account is between 31 and 60 days past due and the event B mean the account is that of a new customer. The intersection of A and B is
a. all new customers.
b. all accounts fewer than 31 or more than 60 days past due.
c. all accounts from new customers and all accounts that are from 31 to 60 days past due.
d. all new customers whose accounts are between 31 and 60 days past due.

ANSWER: d
POINTS: 1
TOPICS: Addition law

27. The probability of an event
a. is the sum of the probabilities of the sample points in the event.
b. is the product of the probabilities of the sample points in the event.
c. is the maximum of the probabilities of the sample points in the event.
d. is the minimum of the probabilities of the sample points in the event.

ANSWER: a
POINTS: 1
TOPICS: Events and their probabilities

28. If $P(A \cap B) = 0$
a. A and B are independent events.
b. $P(A) + P(B) = 1$
c. A and B are mutually exclusive events.
d. either $P(A) = 0$ or $P(B) = 0$.

ANSWER: c
POINTS: 1
TOPICS: Mutually exclusive events

29. If $P(A|B) = .4$, then
a. $P(B|A) = .6$
b. $P(A)*P(B) = .4$

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c. P(A) / P(B) = .4
d. None of the alternatives is correct.

ANSWER: d
POINTS: 1
TOPICS: Conditional probability

30. If P(A|B) = .2 and $P(B^C)$ = .6, then P(B|A)
a. is .8
b. is .12
c. is .33
d. cannot be determined.

ANSWER: d
POINTS: 1
TOPICS: Bayes' Theorem

31. A method of assigning probabilities that assumes the experimental outcomes are equally likely is referred to as the
a. objective method
b. classical method
c. subjective method
d. experimental method

ANSWER: b
POINTS: 1
TOPICS: Assigning probabilities

32. When the results of experimentation or historical data are used to assign probability values, the method used to assign probabilities is referred to as the
a. relative frequency method
b. subjective method
c. classical method
d. posterior method

ANSWER: a
POINTS: 1
TOPICS: Assigning probabilities

33. A method of assigning probabilities based upon judgment is referred to as the
a. relative method
b. probability method
c. classical method
d. None of the alternatives is correct.

ANSWER: d
POINTS: 1
TOPICS: Assigning probabilities

34. The union of events A and B is the event containing
a. all the sample points common to both A and B

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b. all the sample points belonging to A or B
c. all the sample points belonging to A or B or both
d. all the sample points belonging to A or B, but not both

ANSWER: c
POINTS: 1
TOPICS: Addition law

35. If P(A) = 0.38, P(B) = 0.83, and P(A $\cap$ B) = 0.27; then P(A $\cup$ B) =
a. 1.21
b. 0.94
c. 0.72
d. 1.48

ANSWER: b
POINTS: 1
TOPICS: Addition law

36. When the conclusions based upon the aggregated crosstabulation can be completely reversed if we look at the unaggregated data, the occurrence is known as
a. reverse correlation
b. inferential statistics
c. Simpson's paradox
d. disaggregation

ANSWER: c
POINTS: 1
TOPICS: Simpson's paradox

37. Before drawing any conclusions about the relationship between two variables shown in a crosstabulation, you should
a. investigate whether any hidden variables could affect the conclusions
b. construct a scatter diagram and find the trendline
c. develop a relative frequency distribution
d. construct an ogive for each of the variables

ANSWER: a
POINTS: 1
TOPICS: Simpson's paradox

38. Revised probabilities of events based on additional information are
a. joint probabilities
b. posterior probabilities
c. marginal probabilities
d. complementary probabilities

ANSWER: b
POINTS: 1
TOPICS: Bayes' Theorem

39. The probability of an intersection of two events is computed using the

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a. addition law
b. subtraction law
c. multiplication law
d. division law

ANSWER: c
POINTS: 1
TOPICS: Multiplication law

40. Of the last 100 customers entering a computer shop, 25 have purchased a computer. If the classical method for computing probability is used, the probability that the next customer will purchase a computer is
a. 0.25
b. 0.50
c. 0.75
d. 1.00

ANSWER: b
POINTS: 1
TOPICS: Classical method

41. The probability of at least one head in two flips of a coin is
a. 0.33
b. 0.50
c. 0.75
d. 1.00

ANSWER: c
POINTS: 1

42. Posterior probabilities are computed using
a. the classical method
b. Chebyshev's theorem
c. the empirical rule
d. Bayes' theorem

ANSWER: d
POINTS: 1

43. The complement of $P(A \mid B)$ is
a. $P(A^C \mid B)$
b. $P(A \mid B^C)$
c. $P(B \mid A)$
d. $P(A \cap B)$

ANSWER: a
POINTS: 1

44. An element of the sample space is
a. an event

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b. an estimator
c. a sample point
d. an outlier

ANSWER: c
POINTS: 1

45. Posterior probabilities are
a. simple probabilities
b. marginal probabilities
c. joint probabilities
d. conditional probabilities

ANSWER: d
POINTS: 1

46. The range of probability is
a. any value larger than zero
b. any value between minus infinity to plus infinity
c. zero to one
d. any value between -1 to 1

ANSWER: c
POINTS: 1

47. Any process that generates well-defined outcomes is
a. an event
b. an experiment
c. a sample point
d. None of the other answers is correct.

ANSWER: b
POINTS: 1

48. An experiment consists of tossing 4 coins successively. The number of sample points in this experiment is
a. 16
b. 8
c. 4
d. 2

ANSWER: a
POINTS: 1

49. Three applications for admission to a local university are checked to determine whether each applicant is male or female. The number of sample points in this experiment is
a. 2
b. 4
c. 6
d. 8

ANSWER: d

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POINTS: 1

50. A graphical device used for enumerating sample points in a multiple-step experiment is a
    a. bar chart
    b. pie chart
    c. histogram
    d. None of the other answers is correct.

ANSWER: d
POINTS: 1

51. An experiment consists of four outcomes with $P(E_1) = 0.2$, $P(E_2) = 0.3$, and $P(E_3) = 0.4$. The probability of outcome E_4 is
    a. 0.500
    b. 0.024
    c. 0.100
    d. 0.900

ANSWER: c
POINTS: 1

52. A(n) _____ is a graphical representation in which the sample space is represented by a rectangle and events are represented as circles.
    a. frequency polygon
    b. histogram
    c. Venn diagram
    d. tree diagram

ANSWER: c
POINTS: 1

53. If A and B are mutually exclusive events with $P(A) = 0.3$ and $P(B) = 0.5$, then $P(A \cap B) =$
    a. 0.30
    b. 0.15
    c. 0.00
    d. 0.20

ANSWER: c
POINTS: 1

54. Which of the following statements is(are) always true?
    a. $-1 \leq P(E_i) \leq 1$
    b. $P(A) = 1 - P(A^c)$
    c. $P(A) + P(B) = 1$
    d. both $P(A) = 1 - P(A^c)$ and $P(A) + P(B) = 1$

ANSWER: b
POINTS: 1

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55. One of the basic requirements of probability is

a. for each experimental outcome E_i, we must have $P(E_i) \geq 1$

b. $P(A) = P(A^c) - 1$

c. if there are *k* experimental outcomes, then $P(E_1) + P(E_2) + ... + P(E_k) = 1$

d. both $P(A) = P(A^c) - 1$ and if there are *k* experimental outcomes, then $P(E_1) + P(E_2) + ... + P(E_k) = 1$

ANSWER: c
POINTS: 1

56. Events A and B are mutually exclusive. Which of the following statements is also true?

a. A and B are also independent

b. P(A Y B) = P(A)P(B)

c. P(A Y B) = P(A) + P(B)

d. $P(A \cap B) = P(A) + P(B)$

ANSWER: a
POINTS: 1

Subjective Short Answer

57. A market study taken at a local sporting goods store showed that of 20 people questioned, 6 owned tents, 10 owned sleeping bags, 8 owned camping stoves, 4 owned both tents and camping stoves, and 4 owned both sleeping bags and camping stoves.

Let: Event A = owns a tent
Event B = owns a sleeping bag
Event C = owns a camping stove

and let the sample space be the 20 people questioned.

a. Find P(A), P(B), P(C), P(A ∩C), P(B ∩C).
b. Are the events A and C mutually exclusive? Explain briefly.
c. Are the events B and C independent events? Explain briefly.
d. If a person questioned owns a tent, what is the probability he also owns a camping stove?
e. If two people questioned own a tent, a sleeping bag, and a camping stove, how many own only a camping stove? In this case is it possible for 3 people to own both a tent and a sleeping bag, but not a camping stove?

ANSWER:

a. P(A) = .3; P(B) = .5; P(C) = .4; P(A ∩B) = .2; P(B ∩C) = .2
b. Events B and C are not mutually exclusive because there are people (4 people) who both own a tent and a camping stove.
c. Since P(B ∩C) = .2 and P(B)P(C) = (.5)(.4) = .2, then these events are independent.
d. .667
e. Two people own only a camping stove; no, it is not possible

POINTS: 1
TOPICS: Basic relationships of probability

58. An accounting firm has noticed that of the companies it audits, 85% show no inventory shortages, 10% show small inventory shortages and 5% show large inventory shortages. The firm has devised a new accounting test for which it believes the following probabilities hold:

P(company will pass test | no shortage) = .90

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P(company will pass test | small shortage) = .50
P(company will pass test | large shortage) = .20

a. If a company being audited fails this test, what is the probability of a large or small inventory shortage?
b. If a company being audited passes this test, what is the probability of no inventory shortage?

ANSWER:
a. .515
b. .927

POINTS: 1

TOPICS: Conditional probability

59. An investment advisor recommends the purchase of stock shares in Infomatics, Inc. He has made the following predictions:

P(Stock goes up 20% | Rise in GDP) = .6
P(Stock goes up 20% | Level GDP) = .5
P(Stock goes up 20% | Fall in GDP) = .4

An economist has predicted that the probability of a rise in the GDP is 30%, whereas the probability of a fall in the GDP is 40%.

a. What is the probability that the stock will go up 20%?
b. We have been informed that the stock has gone up 20%. What is the probability of a rise or fall in the GDP?

ANSWER:
a. .49
b. .367 + .327 = .694

POINTS: 1

TOPICS: Conditional probability

60. Global Airlines operates two types of jet planes: jumbo and ordinary. On jumbo jets, 25% of the passengers are on business while on ordinary jets 30% of the passengers are on business. Of Global's air fleet, 40% of its capacity is provided on jumbo jets. (Hint: The 25% and 30% values are conditional probabilities stated as percentages.)

a. What is the probability a randomly chosen business customer flying with Global is on a jumbo jet?
b. What is the probability a randomly chosen non-business customer flying with Global is on an ordinary jet?

ANSWER:
a. .357
b. .583

POINTS: 1

TOPICS: Conditional probability

61. The following probability model describes the number of snow storms for Washington, D.C. for a given year:

Number of Storms	0	1	2	3	4	5	6
Probability	.25	.33	.24	.11	.04	.02	.01

The probability of 7 or more snowstorms in a year is 0.

a. What is the probability of more than 2 but less than 5 snowstorms?
b. Given this a particularly cold year (in which 2 snowstorms have already been observed), what is the conditional probability that 4 or more snowstorms will be observed?
c. If at the beginning of winter there is a snowfall, what is the probability of at least one more

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snowstorm before winter is over?

ANSWER:

a. .15
b. .167
c. .56

POINTS: 1

TOPICS: Basic relationships of probability

62. Safety Insurance Company has compiled the following statistics. For any one year period:

P(accident | male driver under 25) = .22
P(accident | male driver over 25) = .15
P(accident | female driver under 25 = .16
P(accident | female driver over 25) = .14

The percentage of Safety's policyholders in each category are:

Male Under 25	20%
Male Over 25	40%
Female Under 25	10%
Female Over 25	30%

a. What is the probability that a randomly selected policyholder will have an accident within the next year?
b. Given that a driver has an accident, what is the probability that the driver is a male over 25?
c. Given that a driver has no accident, what is the probability the driver is a female?
d. Does knowing the fact that a driver has had no accidents give us a great deal of information regarding the driver's sex?

ANSWER:

a. .162
b. .37
c. .408
d. no

POINTS: 1

TOPICS: Conditional probability

63. Mini Car Motors offers its luxury car in three colors: gold, silver and blue. The vice president of advertising is interested in the order of popularity of the color choices by customers during the first month of sales.

a. How many sample points are there in this experiment?
b. If the event A = gold is the most popular color, list the outcome(s) in event A.
c. If the event B = blue is the least popular color, list the outcome(s) in $A \cap B$.
d. List the outcome(s) in $A \cap B^c$.

ANSWER:

a. 6
b. {(G,S,B), (G,B,S)}
c. {(G,S,B)}
d. {(G,B,S)}

POINTS: 1

TOPICS: Sample space

64. Higbee Manufacturing Corp. has recently received 5 cases of a certain part from one of its suppliers. The defect rate for the parts is normally 5%, but the supplier has just notified Higbee that one of the cases shipped to them has been made

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on a misaligned machine that has a defect rate of 97%. So the plant manager selects a case at random and tests a part.

a. What is the probability that the part is defective?
b. Suppose the part is defective, what is the probability that this is from the case made on the misaligned machine?

After finding that the first part was defective, suppose a second part from the case is tested.

c. However, this part is found to be good. Using the revised probabilities from part (b) compute the new probability of these parts being from the defective case.
d. Do you think you would obtain the same posterior probabilities as in part (c) if the first part was not found to be defective but the second part was?
e. Suppose, because of other evidence, the plant manager was 80% certain this case was the one made on the misaligned machine. How would your answer to part (b) change?

ANSWER:

a. .234
b. .829
c. .133
d. yes
e. .987

POINTS: 1

TOPICS: Bayes' Theorem

65. A package of candy contains 12 brown, 5 red, and 8 green candies. You grab three pieces from the package. Give the sample space of colors you could get. Order is not important.

ANSWER: Order is not implied: S = {BBB, RRR, GGG, BBR, BBG, RRB, RRG, GGB, GGR, BRG}

POINTS: 1

TOPICS: Sample space

66. There are two more assignments in a class before its end, and if you get an A on at least one of them, you will get an A for the semester. Your subjective assessment of your performance is

Event	Probability
A on paper and A on exam	.25
A on paper only	.10
A on exam only	.30
A on neither	.35

a. What is the probability of getting an A on the paper?
b. What is the probability of getting an A on the exam?
c. What is the probability of getting an A in the course?
d. Are the grades on the assignments independent?

ANSWER:

a. .35
b. .55
c. .65
d. No

POINTS: 1

TOPICS: Basic relationships of probability

67. A mail order company tracks the number of returns it receives each day. Information for the last 50 days shows

Number of returns	Number of days
0 - 99	6
100 - 199	20

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200 - 299	15
300 or more	9

a. How many sample points are there?
b. List and assign probabilities to sample points.
c. What procedure was used to assign these probabilities?

ANSWER:

a. 4
b. P(0 - 99 returns) = .12
P(100 - 199 returns) = .40
P(200 - 299 returns) = .30
P(300 or more returns) = .18
c. Relative frequency method

POINTS: 1

TOPICS: Relative frequency method

68. Super Cola sales breakdown as 80% regular soda and 20% diet soda. While 60% of the regular soda is purchased by men, only 30% of the diet soda is purchased by men. If a woman purchases Super Cola, what is the probability that it is a diet soda?

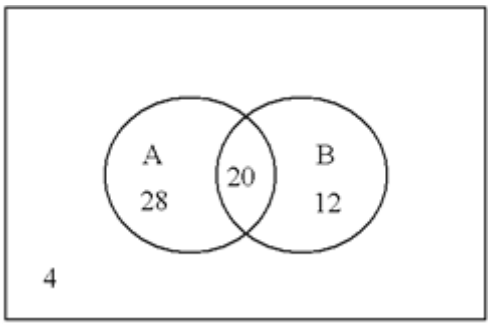
ANSWER: .30435

POINTS: 1

TOPICS: Conditional probability

69. A food distributor carries 64 varieties of salad dressing. Appleton Markets stocks 48 of these flavors. Beacon Stores carries 32 of them. The probability that a flavor will be carried by Appleton or Beacon is 15/16. Use a Venn diagram to find the probability a flavor is carried by both Appleton and Beacon.

ANSWER: The Venn diagram is



and $P(A \cap B) = P(A) + P(B) - P(A \cup B) = 6/8 + 4/8 - 15/16 = 5/16 = .3125$

POINTS: 1

TOPICS: Addition law

70. Through a telephone survey, a low-interest bank credit card is offered to 400 households. The responses are as tabled.

	Income ≤ $60,000	Income > $60,000
Accept offer	40	30
Reject offer	210	120

a. Develop a joint probability table and show the marginal probabilities.
b. What is the probability of a household whose income exceeds $60,000 and who rejects the offer?

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c. If income is ≤ $60,000, what is the probability the offer will be accepted?
d. If the offer is accepted, what is the probability that income exceeds $60,000?

ANSWER:

a.

	Income ≤ $60,000	Income > $60,000	Total
Accept offer	.100	.075	.175
Reject offer	.525	.300	.825
Total	.625	.375	1.000

b. .3
c. .16
d. .4286

POINTS: 1

TOPICS: Conditional probability

71. A medical research project examined the relationship between a subject's weight and recovery time from a surgical procedure, as shown in the table below.

	Underweight	Normal weight	Overweight
Less than 3 days	6	15	3
3 to 7 days	30	95	20
Over 7 days	14	40	27

a. Use relative frequency to develop a joint probability table to show the marginal probabilities.
b. What is the probability a patient will recover in fewer than 3 days?
c. Given that recovery takes over 7 days, what is the probability the patient is overweight?

ANSWER:

a.

	Underweight	Normal weight	Overweight	Total
Less than 3 days	.024	.06	.012	.096
3 to 7 days	.120	.38	.080	.580
Over 7 days	.056	.16	.108	.324
Total	.200	.60	.200	1.00

b. .096
c. 27/81 = .33

POINTS: 1

TOPICS: Conditional probability

72. To better track its patients, a hospital's neighborhood medical center has gathered this information.

	New patient (N)	Existing patient (E)
Scheduled appointment (A)	10	10
Walk-in (W)	12	18

a. Develop a joint probability table. Include the marginal probabilities.
b. Find the conditional probabilities:
P(A|N), P(A|E), P(W|N), P(W|E), P(N|A), P(E|A), P(N|W), P(E|W)

ANSWER:

a.

	New patient (N)	Existing patient (E)	Total
Scheduled appointment (A)	.20	.20	.40
Walk-in (W)	.24	.36	.60
Total	.44	.56	1.00

b. P(A|N) = .4545

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P(A|E) = .3571
P(W|N) = .5454
P(W|E) = .6429
P(N|A) = .5
P(E|A) = .5
P(N|W) = .4
P(E|W) = .6

POINTS: 1

TOPICS: Conditional probability

73. The Ambell Company uses batteries from two different manufacturers. Historically, 60% of the batteries are from manufacturer 1, and 90% of these batteries last for over 40 hours. Only 75% of the batteries from manufacturer 2 last for over 40 hours. A battery in a critical tool fails at 32 hours. What is the probability it was from manufacturer 2?

ANSWER: .625

POINTS: 1

TOPICS: Bayes' Theorem

74. It is estimated that 3% of the athletes competing in a large tournament are users of an illegal drug to enhance performance. The test for this drug is 90% accurate. What is the probability that an athlete who tests positive is actually a user?

ANSWER: .2177

POINTS: 1

TOPICS: Bayes' Theorem

75. Thirty-five percent of the students who enroll in a statistics course go to the statistics laboratory on a regular basis. Past data indicates that 40% of those students who use the lab on a regular basis make a grade of B or better. On the other hand, 10% of students who do not go to the lab on a regular basis make a grade of B or better. If a particular student made an A, determine the probability that she or he used the lab on a regular basis.

ANSWER: 0.6829

POINTS: 1

TOPICS: Conditional probability

76. In a recent survey in a Statistics class, it was determined that only 60% of the students attend class on Fridays. From past data it was noted that 98% of those who went to class on Fridays pass the course, while only 20% of those who did not go to class on Fridays passed the course.
a. What percentage of students is expected to pass the course?
b. Given that a person passes the course, what is the probability that he/she attended classes on Fridays?

ANSWER: a. 66.8%
b. 0.88

POINTS: 1

TOPICS: Conditional probability

77. An applicant has applied for positions at Company A and Company B. The probability of getting an offer from Company A is 0.4, and the probability of getting an offer from Company B is 0.3. Assuming that the two job offers are independent of each other, what is the probability that
a. the applicant gets an offer from both companies?
b. the applicant will get at least one offer?
c. the applicant will not be given an offer from either company?
d. Company A does not offer the applicant a job, but Company B does?

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ANSWER: a. 0.12
b. 0.58
c. 0.42
d. 0.18

POINTS: 1

TOPICS: Multiplication law

78. A corporation has 15,000 employees. Sixty-two percent of the employees are male. Twenty-three percent of the employees earn more than $30,000 a year. Eighteen percent of the employees are male and earn more than $30,000 a year.

a. If an employee is taken at random, what is the probability that the employee is male?
b. If an employee is taken at random, what is the probability that the employee earns more than $30,000 a year?
c. If an employee is taken at random, what is the probability that the employee is male and earns more than $30,000 a year?
d. If an employee is taken at random, what is the probability that the employee is male or earns more than $30,000 a year or both?
e. The employee taken at random turns out to be male. Compute the probability that he earns more than $30,000 a year.
f. Are being male and earning more than $30,000 a year independent?

ANSWER: a. 0.62
b. 0.23
c. 0.18
d. 0.67
e. 0.2903
f. No

POINTS: 1

TOPICS: Conditional probability

79. You are given the following information on Events A, B, C, and D.

P(A) = .4	P(A U D) = .6	P(A) C) = .04
P(B) = .2	P(A | B) = .3	P(A) D) = .03
P(C) = .1		

a. Compute P(D).
b. Compute P(A) B).
c. Compute P(A | C).
d. Compute the probability of the complement of C.
e. Are A and B mutually exclusive? Explain your answer.
f. Are A and B independent? Explain your answer.
g. Are A and C mutually exclusive? Explain your answer.
h. Are A and C independent? Explain your answer.

ANSWER:

POINTS: 1

80. A government agency has 6,000 employees. The employees were asked whether they preferred a four-day work week (10 hours per day), a five-day work week (8 hours per day), or flexible hours. You are given information on the employees' responses broken down by gender.

	Male	Female	Total
Four days	300	600	900

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Five days	1,200	1,500	2,700
Flexible	300	2,100	2,400
Total	1,800	4,200	6,000

a. What is the probability that a randomly selected employee is a man and is in favor of a four-day work week?
b. What is the probability that a randomly selected employee is female?
c. A randomly selected employee turns out to be female. Compute the probability that she is in favor of flexible hours.
d. What percentage of employees is in favor of a five-day work week?
e. Given that a person is in favor of flexible time, what is the probability that the person is female?
f. What percentage of employees is male and in favor of a five-day work week?

ANSWER:

a. 0.05
b. 0.7
c. 0.5
d. 45%
e. 0.875
f. 20%

POINTS: 1

81. A bank has the following data on the gender and marital status of 200 customers.

	Male	Female
Single	20	30
Married	100	50

a. What is the probability of finding a single female customer?
b. What is the probability of finding a married male customer?
c. If a customer is female, what is the probability that she is single?
d. What percentage of customers is male?
e. If a customer is male, what is the probability that he is married?
f. Are gender and marital status mutually exclusive?
g. Is marital status independent of gender? Explain using probabilities.

ANSWER:

a. 0.15
b. 0.5
c. 0.375
d. 60%
e. 0.833
f. No, the probability of intersection is not zero.
g. They are not independent because P(male) = 0.6 and P(male | single) = 0.4

POINTS: 1

82. Tammy is a general contractor and has submitted two bids for two projects (A and B). The probability of getting project A is 0.65. The probability of getting project B is 0.77. The probability of getting at least one of the projects is 0.90.
a. What is the probability that she will get both projects?
b. Are the events of getting the two projects mutually exclusive? Explain, using probabilities.
c. Are the two events independent? Explain, using probabilities.

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ANSWER:

a. 0.52
b. No, the probability of their intersection is not zero.
c. No, $P(A \mid B) = 0.6753 \quad \overline{P}(A)$

POINTS: 1

83. Assume you are taking two courses this semester (A and B). Based on your opinion, you believe the probability that you will pass course A is 0.835; the probability that you will pass both courses is 0.276. You further believe the probability that you will pass at least one of the courses is 0.981.

a. What is the probability that you will pass course B?
b. Is the passing of the two courses independent events? Use probability information to justify your answer.
c. Are the events of passing the courses mutually exclusive? Explain.
d. What method of assigning probabilities did you use?

ANSWER:

a. 0.422
b. No, $P(A \mid B) = 0.654 \neq P(A)$
c. No, the probability of their intersection is not zero.
d. the subjective method

POINTS: 1

84. Assume you have applied to two different universities (let's refer to them as Universities A and B) for your graduate work. In the past, 25% of students (with similar credentials as yours) who applied to University A were accepted, while University B accepted 35% of the applicants. Assume events are independent of each other.

a. What is the probability that you will be accepted in both universities?
b. What is the probability that you will be accepted to at least one graduate program?
c. What is the probability that one and only one of the universities will accept you?
d. What is the probability that neither university will accept you?

ANSWER:

a. 0.0875
b. 0.5125
c. 0.425
d. 0.4875

POINTS: 1

85. A survey of a sample of business students resulted in the following information regarding the genders of the individuals and their major.

	Major			
Gender	Management	Marketing	Others	Total
Male	40	10	30	80
Female	30	20	70	120
Total	70	30	100	200

a. What is the probability of selecting an individual who is majoring in Marketing?
b. What is the probability of selecting an individual who is majoring in Management, given that the person is female?
c. Given that a person is male, what is the probability that he is majoring in Management?

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d. What is the probability of selecting a male individual?

ANSWER:
a. 0.15
b. 0.25
c. 0.50
d. 0.40

POINTS: 1

86. There are two more assignments in a class before its end, and if you get an A on at least one of them, you will get an A for the semester. Your subjective assessment of your performance is

Event	Probability
A on paper and A on exam	.25
A on paper only	.10
A on exam only	.30
A on neither	.35

a. What is the probability of getting an A on the paper?
b. What is the probability of getting an A on the exam?
c. What is the probability of getting an A in the course?
d. Are the grades on the assignments independent?

ANSWER: a. .35
b. .55
c. .65
d. No

POINTS: 1

Essay

87. Compare these two descriptions of probability: 1) a measure of the degree of uncertainty associated with an event, and 2) a measure of your degree of belief that an event will happen.

ANSWER: Answer not provided.
POINTS: 1
TOPICS: Introduction

88. Explain the difference between mutually exclusive and independent events. Can a pair of events be both mutually exclusive and independent?
ANSWER: Answer not provided.
POINTS: 1
TOPICS: Multiplication law

89. Use a tree diagram, labeled with appropriate notation, to illustrate Bayes' theorem.
ANSWER: Answer not provided.
POINTS: 1
TOPICS: Bayes' theorem

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90. Discuss the problems inherent in using words such as "likely," "possibly," or "probably" to convey degree of belief.
ANSWER: Answer not provided.
POINTS: 1
TOPICS: Introduction

91. Draw a Venn diagram and label appropriately to show events A, B, their complements, intersection, and union.

ANSWER: Answer not provided.
POINTS: 1
TOPICS: Basic relationships of probability

92. Describe four experiments and list the experimental outcomes associated with each one.
ANSWER: Answer not provided.
POINTS: 1
TOPICS: Experiments and the sample space

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