Questions

1. Which of the following assignments of probabilities to the sample points A, B, C and D is valid if A, B, C, and D are the only sample points in the experiment?

   Select one:

   a. $P(A) = 1/9$, $P(B) = 1/4$, $P(C) = 1/2$, $P(D) = 0$
   b. $P(A) = 0$, $P(B) = 1/14$, $P(C) = 13/14$, $P(D) = 0$
   c. $P(A) = 1/5$, $P(B) = 1/5$, $P(C) = 1/5$, $P(D) = -1$
   d. $P(A) = -1/4$, $P(B) = 1/2$, $P(C) = 3/4$, $P(D) = 1$

   Hint   b) $P(A) \geq 0, P(B) \geq 0, P(C) \geq 0, P(C) \geq 0$
   $$P(A) + P(B) + P(C) + P(D) = 1$$

2. An experiment consists of randomly choosing a number between 1 and 10. Let E be the event that the number chosen is odd. List the sample points in E.

   Select one:

   a. $\{5\}$
   b. $\{2, 4, 6, 8, 10\}$
   c. $\{1, 3, 5, 7, 9\}$
   d. $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

3. If sample points A, B, C, and D are the only possible outcomes of an experiment, find the probability of D using the table below.

Sample point	A	B	C	D
Probability	1/5	1/5	1/5	?

Select one:

a. 1/4

b. 2/5

c. 1/5

d. 3/5

Hint: $P(A) + P(B) + P(C) + P(D)=1$

4. The outcome of an experiment is the number of resulting heads when a nickel and a dime are flipped simultaneously. What is the sample space for this experiment?

Select one:

a. {0, 1, 2}

b. {nickel, dime}

c. {HH, HT, TT, }

d. {HH, HT, TH, TT}

5. A bag of colored candies contains 20 red, 25 yellow, 15 blue and 20 orange candies. An experiment consists of randomly choosing one candy from the bag and recording its color. What is the sample space for this experiment?

Select one:

a. {red, yellow, orange}

b. {red, yellow, blue, orange}

c. {1/4, 5/16, 7/16}

d. {80}

e. {20, 25, 15, 20}

6. Flip a coin twice, create the sample space of possible outcomes (H: Head, T: Tail).

Select one:

a. HT TH

b. TT HT HT

c. HH HT TH TT

d. HH TT HT HT

7. Flip a coin three times, create the sample space of possible outcomes (H: Head, T: Tail).

Select one:

a. HHH TTT THT HTH HHT TTH HTH

b. HHH HTT HTH TTT HTT THH HHT THT

c. HTT THT HTH HHH TTH TTT

d. HHH HHT HTH HTT THH THT TTH TTT

8. Hahn is having his sixth litter. The prior litters have either been three normal pups or two normal pups and a runt. Assume the probability of either outcome is 50%. Create the sample space of possible outcomes (Normal: N, Runt: R).

Select one:

a. NR NNR NNR

b. NNR NNN

c. N NN NR NNN NRN

d. NNN RNN NR

9. Both Nualart and Tom have a bag of candy containing a lollipop (LP), a cherry drop (CD), and a lemon drop (LD). Each takes out a piece and eats it. What are the possible pairs of candies eaten?

a. LD-LD CD-LD LP-LP LD-LP CD-CD LD-LP LP-CD CD-LP LP-LD

b. LD-LD CD-LD LP-LP LD-CD CD-CD LD-LP LP-CD CD-LP LP-LD

c. CD-LD LD-LP LP-CD LP-LP LD-LD

d. LD-CD LD-CD LD-CD LD-LP LD-LP LD-LP CD-LP CD-LP CD-LP

10. Two white sheep mate. The male has both a white and a black fur-color gene. The female has only white fur-color genes. The fur color of the offspring depends on the pairs of fur-color genes that they receive. Assume that neither the white nor the black gene dominates. List the possible outcomes. W = white and B = black.

a. WW, BB

b. WW, BW

c. WB, BW

d. WW, WW

1. The probability that a house in an urban area will be burglarized is 3%. If 30 houses are randomly selected, what is the probability that none of the houses will be burglarized?

Select one:

a. 0.557

b. 0.001

c. 0.020

d. 0.4010

Hint: $P(A) = P(B')^{30} = (1\text{-}0.03)^{30} = 0.4010$

2. Sixty-five percent of men consider themselves knowledgeable football fans. If 15 men are randomly selected, find the probability that exactly five of them will consider themselves knowledgeable fans.

Select one:

a. 0.6541

b. 0.0341

c. 0.0096

d. 0.3853

Hint: $P(A) = \dfrac{n!}{(n-k)!k!} p^k (1-p)^{n-k} = \dfrac{15!}{(15-5)!5!} 0.65^5 (1-0.65)^{15-5} = 0.00961175$

3. Assume that male and female births are equally likely and that the birth of any child does not affect the probability of the gender of any other children. Find the probability of at most two boys in five births.

Select one:

a. 0.172

b. 0.333

c. 0.500

d. 0.300

$$P(B) = \sum_{i=0}^{k} \frac{n!}{(n-i)!\,i!} p^i (1-p)^{n-i} = \sum_{i=0}^{2} \frac{5!}{(5-i)!\,i!} 0.5^i (1-0.5)^{5-i} = 0.500$$

4. A random number generator is set top generate integer random numbers between 0 and 9 inclusive following a uniform distribution. What is the probability of the random number generator generating a 6?

Select one:

a. 1/2

b. 0.07

c. 1/10

d. 1/9

5. Sixty percent of the people that get mail-order catalogs order something. Find the probability that only three of 8 people getting these catalogs will order something.

Select one:

a. 0.001

b. 0.300

c. 0.124

d. 0.117

$$P(B) = \frac{n!}{(n-i)!\,i!}p^i(1-p)^{n-i} = 0.123863$$

6. The probability that a tennis set will go to a tie-breaker is 15%. What is the probability that two of three sets will go to tie-breakers?

Select one:

a. 0.057

b. 0.072

c. 0.0289

d. 0.351

7. For two events A and B, P(A) = 0.4, P(B) = 0.3, and P(A and B) = 0. It follows that A and B are

Select one:

a. disjoint but not independent.

b. neither disjoint nor independent.

c. both disjoint and independent.

d. complementary.

8. For two events A and B, P(A) = 0.8, P(B) = 0.2, and P(A and B) = 0.16. It follows that A and B are

Select one:

a. disjoint but not independent.

b. both disjoint and independent.

c. neither disjoint nor independent.

d. independent but not disjoint.

9. At a Ohio college, 25% of students speak Spanish, 5% speak French, and 3% speak both languages. What is the probability that a student chosen at random from the college speaks Spanish but not French?

Select one:

a. 0.22

b. 0.17

c. 0.24

d. 0.19

10. If two balanced die are rolled, the possible outcomes can be represented as follows

(1, 1) (2, 1) (3, 1) (4, 1) (5, 1) (6, 1)
(1, 2) (2, 2) (3, 2) (4, 2) (5, 2) (6, 2)
(1, 3) (2, 3) (3, 3) (4, 3) (5, 3) (6, 3)
(1, 4) (2, 4) (3, 4) (4, 4) (5, 4) (6, 4)
(1, 5) (2, 5) (3, 5) (4, 5) (5, 5) (6, 5)
(1, 6) (2, 6) (3, 6) (4, 6) (5, 6) (6, 6)

Determine the probability that the sum of the dice is 7.

Select one:

a. 5/36

b. 1/6

c. 2/9

d. 3/12

1. According to a 2007 report published by the Columbia University, 65% of teens have family dinners five or more times a week, 15% of teens have used marijuana and the proportion of teens who have family dinners 5 or more times a week or use marijuana is 0.69. What is the probability that a teen has family dinners five or more times a week and uses marijuana?

Hint. Use the addition rules.

Select one:

a. 0.64

b. 0.08

c. 0.11

d. 0.18

$$P(A \cap B) = P(A) + P(B) - P(A \cup B) = 0.65 + 0.15 - 0.69 = 0.11$$

2. For two events A and B, P(A) = 0.4, P(B) = 0.5. Then P(A or B) equals

Select one:

a. 0.7, if A and B are independent.

b. 0.2, if A and B are independent.

c. 0.7, if A and B are disjoint.

d. 0.9, if A and B are independent.

3. In 2006, the General Social Survey asked 4,491 respondents how often they attended religious services. The responses were as follows:

Number of respondents	Number of respondents
Never	1020
Less than once a year	302
Once a year	571
Several times a year	502
Once a month	308
Two-three times a month	380
Nearly every week	240
Every week	839
More than once a week	329

What is the probability that a randomly selected respondent attended religious services more than once a month?
Select one:
a. 0.717
b. 0.398
c. 0.580
d. 0.424

4. According to the U.S. census, in 2005 25% of homicide victims were known to be female, 8.7% were known to be under the age of 18 and 2.7% were known to be females under the age of 18. What is the probability that a murder victim was known to be female or under the age of 18 based on these 2005 estimates?

Select one:

a. 0.02

b. 0.9

c. 0.310

d. 0.279

$$P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.25 + 0.087 - 0.027 = 0.31$$

5. According to a survey result, 79.6% of respondents favored the gun law, 77.8% favored the death penalty for those convicted of murder and 62.7% were in favor of both. What is the probability that a randomly selected respondent was in favor of either the gun law or the death penalty for persons convicted of murder?

Hint. Use the addition rules.

Select one:

a. 0.847

b. 0.527

c. 0.796

d. 0.947

$$P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.796 + 0.778 - 0.627 = 0.947$$

6. A survey of senior citizens at a doctor's office shows that 65% take blood pressure-lowering medication, 38% take cholesterol-lowering medication, and 7% take both medications. What is the probability that a senior citizen takes either blood pressure-lowering or cholesterol-lowering medication?

Select one:

a. 0.96

b. 0.14

c. 0.90

d. 0.85

$$P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.65 + 0.38 - 0.07 = 0.96$$

7. The probability that a student at a certain college is male is 0.55. The probability that a student at that college has a job off campus is 0.67. The probability that a student at the college is male and has a job off campus is 0.35. If a student is chosen at random from the college, what is the probability that the student is male or has an off campus job?

Select one:

a. 0.93

b. 0.87

c. 0.37

d. 0.63

8. If you flip a coin three times, the possible outcomes are HHH HHT HTH HTT THH THT TTH TTT. What is the probability of getting at most one head?

Select one:

a. 1/2

b. 6/7

c. 7/8

d. 5/6

9. If two balanced die are rolled, the possible outcomes can be represented as follows.

(1, 1) (2, 1) (3, 1) (4, 1) (5, 1) (6, 1)
(1, 2) (2, 2) (3, 2) (4, 2) (5, 2) (6, 2)
(1, 3) (2, 3) (3, 3) (4, 3) (5, 3) (6, 3)
(1, 4) (2, 4) (3, 4) (4, 4) (5, 4) (6, 4)
(1, 5) (2, 5) (3, 5) (4, 5) (5, 5) (6, 5)
(1, 6) (2, 6) (3, 6) (4, 6) (5, 6) (6, 6)

Determine the probability that the sum of the dice is 4 or 12.

Select one:

a. 7/36

b. 1/2

c. 1/9

d. 5/9

10. The age distribution of students at a community college is given below.

Number of students	Number of students
Under 21	410
21-24	404
25-28	276
29-32	155
33-36	97
37-40	63
Over 40	86

A student from the community college is selected at random. Find the probability that the student is 25 years or over. Give your answer as a decimal rounded to three decimal places.

Select one:

a. 0.271

b. 0.729

c. 0.454

d. 0.726

Chapter 2.4

1. According to a survey of American households, the probability that the residents own 2 cars if annual household income is over $30,000 is 70%. Of the households surveyed, 50% had incomes over $30,000 The probability that the residents of a household own 2 cars and have an income over $30,000 a year is:

Select one:

a. 0.22

b. 0.35

c. 0.48

d. 0.18

$$P(A \cap B) = P(A|B)P(B) = 0.7 * 0.5 = 0.35$$

2. The conditional probability of event G, given the knowledge that event H has occurred, would be written as _____.

Select one:

a. P(G|H)

b. P(H)

c. P(G)

d. P(H | G)

3. After completing an inventory of three warehouses, a golf club shaft manufacturer described its stock of 14,542 shafts with the percentages given in the table. Suppose a shaft is selected at random from the 14,542 currently in stock, and the warehouse number and type of shaft are observed.

Type of Shaft

		Regular	Stiff	Extra Stiff
	1	19%	8%	3%
Warehouse	2	14%	11%	7%
	3	20%	18%	0%

Given that the shaft is produced in warehouse 2, find the probability it has an stiff shaft.

Select one:

a. 0.721

b. 0.344

c. 0.356

d. 0.219

$$P(B|A) = \frac{P(A \cap B)}{P(A)} = \frac{0.11}{0.14 + 0.11 + 0.7} = 0.34375$$

4. A research group asked the students if they carry a credit card. The responses are listed in the table.

Class	Credit Card Carrier	Not Credit Card Carrier	Total
Freshman	50	10	60
Sophomore	30	10	40
	80	20	100

If a student is randomly selected, find the probability that he or she owns a credit card given that the student is a freshman. Round your answer to three decimal places.

Select one:

a. 0.167

b. 0.500

c. 0.625

d. 0.833.

5. According to a survey of American households, the probability that the residents own 2 cars if annual household income is over $35,000 is 70%. Of the households surveyed, 50% had incomes over $35,000. The probability that the residents of a household do not own 2 cars and have an income over $35,000 a year is:

Select one:

a. 0.18

b. 0.45

c. 0.15

d. 0.48

$P(B \cap A') = P(B) - P(B \cap A) = P(B) - P(A|B)P(B) = 0.5 - 0.7 * 0.5 = 0.15$

6. According to a survey of American households, the probability that the residents own 2 cars if annual household income is over $20,000 is 90%. Of the households surveyed, 60% had incomes over $20,000 and 60% had 2 cars. The probability that the residents of a household own 2 cars and have an income less than or equal to $20,000 a year is:

Select one:

a. 0.06

b. 0.22

c. 0.48

d. 0.18

$P(A \cap B') = P(A) - P(A \cap B) = P(A) - P(A|B)P(B) = 0.6 - 0.9 * 0.6 = 0.06$

7. Suppose that P(A|B) = 0.3 and P(B) = 0.4. Determine P(A' and B).

Select one:

a. 0.12

b. 0.75

c. 0.28

d. 0.35

8. Suppose that P(A|B) = 0.3 and P(B) = 0.4. Determine P(A' and B).

Select one:

a. 0.28

b. 0.12

b. 0.12

d. 0.75

9. A group of volunteers for a clinical trial consists of 88 women and 77 men. 28 of the women and 39 of the men have high blood pressure. If one of the volunteers is selected at random find the probability that the person has high blood pressure given that it is a woman.

Select one:

a. 0.318

b. 0.114

c. 0.222

d. 0.486

10. The following table shows the political affiliation of voters in one city and their positions on stronger gun control laws.

	Favor	Oppose
Republican	0.11	0.17
Democrat	0.35	0.16
Other	0.15	0.06

What is the probability that a Democrat opposes stronger gun control laws?
Select one:
a. 0.314
b. 0.490
c. 0.160
d. 0.390

Chapter 2.5

1. A company has 2 machines that produce widgets. An older machine produces 23% defective widgets, while the new machine produces only 8% defective widgets. In addition, the new machine produces 3 times as many widgets as the older machine does. Given that a widget was produced by the new machine, what is the probability it is not defective?

Select one:

a. 0.94

b. 0.06

c. 0.92

d. 0.50

$$P(B'|A) = 1 - P(B|A) = 1 - 0.08 = 0.92$$

2. A company has 2 machines that produce widgets. An older machine produces 23% defective widgets, while the new machine produces only 8% defective widgets. In addition, the new machine produces 3 times as many widgets as the older machine does. Given a randomly chosen widget was tested and found to be defective, what is the probability it was produced by the new machine?

Select one:

a. 0.489

b. 0.15

c. 0.511

d. 0.08

$$P(A|B) = \frac{P(B|A)P(A)}{P(B|A)P(A) + P(B|A')P(A')} = \frac{0.08 * 0.75}{0.08 * 0.75 + 0.23 * 0.25} = 0.510638$$

3. The probability is 2% that an electrical connector that is kept dry fails during the warranty period of a portable computer. If the connector is ever wet, the probability of a failure during the warranty period is 10%. If 80% of the connectors are kept dry and 20% are wet, what proportion of connectors fail during the warranty period?

Select one:

a. 0.036

b. 0.014

c. 0.6

d. 0.08

4. The probability is 5% that an electrical connector that is kept dry fails during the warranty period of a portable computer. If the connector is ever wet, the probability of a failure during the warranty period is 20%. If 90% of the connectors are kept dry and 10% are wet, what proportion of connectors fail during the warranty period?

Select one:

a. 0.065

b. 0.036

c. 0.625

d. 0.086

5. Ms. Anne figures that there is a 40% chance that her company will set up a branch office in Ohio. If it does, she is 70% certain that she will be made manager of this new operation. What is the probability that Anne will be a Ohio branch office manager?

Select one:

a. 0.55

b. 0.18

c. 0.20

d. 0.28

6. A bin contains 15 defective (that immediately fail when put in use), 20 partially defective (that fail after a couple of hours of use), and 30 acceptable transistors. A transistor is chosen at random from the bin and put into use. If it does not immediately fail, what is the probability it is acceptable?

Select one:

a. 0.44

b. 0.60

c. 0.71

d. 0.35

$$P(C|A') = \frac{30}{30 + 20} = 0.6$$

1. Two events A and B are said to be _____ if $P(A/B) = P(A)$ or if $P(B/A) = P(B)$.

Select one:

a. Mutually exclusive

b. Complementary

c. Independent

d. Simple events

2. Assume that $P(A) = 0.7$ and $P(B) = 0.2$. If A and B are independent, find $P(A$ and $B)$.

Select one:

a. 0.90

b. 1.00

c. 0.76

d. 0.14

3. If P(A) = 0.45, P(B) = 0.25, and P(B/A) = 0.45, are A and B independent?

Select one:

a. cannot determine

b. yes

c. no

4. If P(A) = 0.72, P(B) = 0.11, and A and B are independent, find P(A/B).

Select one:

a. 0.11

b. 0.72

c. 0.83

d. 0.0792

5. Assume that P(E) = 0.15 and P(F) = 0.48. If E and F are independent, find P(E∩F).

Select one:

a. 0.15

b. 0.558

c. 0.072

d. 0.630

6. If two events A and B are _____, then P($A \cap B$) = P(A)P(B).
Select one:
a. simple events
b. Independent
c. Complements
d. mutually exclusive

7. Assume that $P(C) = 0.5$ and $P(D) = 0.3$. If C and D are independent, find $P(C \cap D)$.
Select one:
a. 0.15
b. 0.3
c. 1.5
d. 0.5

8. Given that events A and B are mutually exclusive and $P(A) = 0.2$ and $P(B) = 0.7$, are A and B independent?
Select one:
a. no
b. cannot be determined
c. yes

9. Given that events C and D are independent, $P(C) = 0.3$, and $P(D) = 0.6$, are C and D mutually exclusive?
Select one:
a. cannot be determined
b. Yes
c. no

10. Given events A and B with probabilities $P(A) = 0.5, P(B) = 0.4$, and $P(A \text{ and } B) = 0.2$, are A and B independent?
Select one:
a. No
b. cannot be determined
c. yes

11. Given events C and D with probabilities $P(C) = 0.3$, $P(D) = 0.2$, and $P(C \text{ and } D) = 0.1$, are C and D independent?
Select one:
a. no
b. cannot be determined
c. yes

12. Given events A and B with probabilities $P(A) = 0.75$ and $P(B) = 0.15$, are A and B mutually exclusive?

a. cannot be determined

b. No

c. yes

Chapter 2.7

1. According to a survey of American households, the probability that the residents own 3 cars if annual household income is over $25,500 is 83%. Of the households surveyed, 62% had incomes over $25,500 and 84% had 3 cars. The probability that annual household income is over $25,500 if the residents of a household own 3 cars is:

Select one:

a. 0.69

b. 0.61

c. 0.42

d. 0.50

$$P(B|A) = \frac{P(A|B)P(B)}{P(A)} = \frac{0.83 * 0.62}{0.84} = 0.612619$$

2. According to a survey of American households, the probability that the residents own 3 cars if annual household income is over $25,500 is 63%. Of the households surveyed, 62% had incomes over $25,500 and 44% had 3 cars. The probability that annual household income is over $25,500 if the residents of a household own 3 cars is:

Select one:

a. 0.50

b. 0.42

c. 0.69

d. 0.89

3. Suppose that P(A|B) = 0.6, P(A) = 0.5 and P(B) = 0.1. Find the value of P(B|A).

Select one:

a. 0.12

b. 0.20

c. 0.30

d. 0.06

$$P(B|A) = \frac{P(A|B)P(B)}{P(A)} = \frac{0.6 * 0.1}{0.5} = 0.12$$

4. It was found that 60% of the workers were white, 30% were black and 10% are other races. Given that a worker was white, the probability that the worker had claimed bias was 30%. Given that a worker was black, the probability that the worker had claimed bias was 40%. Given that a worker was other race, the probability that the worker had claimed bias was 0%.

If a randomly selected worker had claimed bias, what is the probability that the worker is white?

Select one:

a. 0.6

b. 0.7

c. 0.3

d. 0.40.6

$$P(A|D) = \frac{P(D|A)P(A)}{P(D|A)P(A) + P(D|B)P(B) + P(D|C)P(C)} = \frac{0.3 * 0.6}{0.3 * 0.6 + 0.4 * 0.3 + 0 * 0.1} = 0.6$$

5. It was found that 60% of the workers were white, 30% were black and 10% are other races. Given that a worker was white, the probability that the worker had claimed bias was 30%. Given that a worker was black, the probability that the worker had claimed bias was 40%. Given that a worker was other race, the probability that the worker had claimed bias was 0%. If a randomly selected worker had claimed bias, what is the probability that the worker is black?

Select one:

a. 0.4

b. 0.3

c. 0.6

d. 0.7

6. At a Texas college, 60% of the students are from the southern part of the state, 30% are from the northern part of the state, and the remaining 10% are from out-of-state. All students must take and pass an Entry Level Math (ELM) test. 60% of the southerners have passed the ELM, 70% of the northerners have passed the ELM, and 90% of the out-of-state have passed the ELM.

If a randomly selected student has passed the ELM, the probability the student is from out-of-state is _____.

Select one:

a. 0.182

b. 0.875

c. 0.136

d. 0.267

7. In Orange County, 51% of the adults are males. One adult is randomly selected for a survey involving credit card usage. It is later learned that the selected survey subject was smoking a cigar. Also, 7.5% of males smoke cigars, whereas 1.9% of females smoke cigars. Use this additional information to find the probability that the selected subject is a male.

Select one:

a. 0.804

b. 0.203

c. None of the other choices is true

d. 0.901

$$P(A|B) = \frac{P(B|A)P(A)}{P(B|A)P(A) + P(B|A')P(A')} = \frac{0.075 * 0.51}{0.075 * 0.51 + 0.019 * 0.49} = 0.804247$$

8. In a study of pleas and prison sentences, it is found that 35% of the subjects studied were sent to prison. Among those sent to prison, 30% chose to plead guilty. Among those not sent to prison, 50% chose to plead guilty.
If a study subject is randomly selected and it is then found that the subject entered a guilty plea, find the probability that this person was not sent to prison.

Select one:

a. 0.756

b. None of the other choices is true

c. 0.347

d. 0.863

9. An aircraft emergency locator transmitter (ELT) is a device designed to transmit a signal in the case of a crash. The Altigauge Manufacturing Company makes 85% of the ELTs, the Bryant Company makes 10% of them, and the Chartair Company makes the other 5%. The ELTs made by Altigauge have a 3% rate of defects, the Bryant ELTs have a 5% rate of defects, and the Chartair ELTs have a 10% rate of defects.

If a randomly selected ELT is then tested and is found to be defective, find the probability that it was made by the Altigauge Manufacturing Company.

Select one:

a. 0.603

a. 0.603

a. 0.603

d. 0.718