



1. The probability of at least one head in two flips of a coin is _____.
 - a. .33
 - b. .50
 - c. .75
 - d. 1
2. An element of the sample space is a(n) _____.
 - a. event
 - b. estimator
 - c. sample point
 - d. outlier
3. Any process that generates well-defined outcomes is _____.
 - a. an event
 - b. an experiment
 - c. a sample point
 - d. None of the answers is correct.
4. The sample space refers to _____.
 - a. any particular experimental outcome
 - b. the sample size minus 1
 - c. the set of all possible experimental outcomes
 - d. both any particular experimental outcome and the set of all possible experimental outcome
5. Assume your favorite football team has two games left to finish the season. The outcome of each game can be win, lose, or tie. The number of possible outcomes is _____.
 - a. 2
 - b. 4
 - c. 6
 - d. 9
6. An experiment consists of four outcomes with $P(E1) = .2$, $P(E2) = .3$, and $P(E3) = .4$. The probability of outcome $E4$ is _____.
 - a. .500
 - b. .024
 - c. .100
 - d. .900
7. If $P(A) = .38$, $P(B) = .83$, and $P(A \cap B) = .24$; then $P(A \cup B) =$
 - a. 1.21
 - b. .97

- c. .76
 - d. 1.45
8. If $P(A) = .75$, $P(A \cup B) = .86$, and $P(A \cap B) = .56$, then $P(B) =$
- a. .25
 - b. .67
 - c. .56
 - d. .11
9. If A and B are mutually exclusive events with $P(A) = .3$ and $P(B) = .5$, then $P(A \cup B) =$
- a. 0
 - b. .15
 - c. .8
 - d. .2
10. If two events are independent, then -----.
- a. they must be mutually exclusive
 - b. the sum of their probabilities must be equal to 1
 - c. the probability of their intersection must be 0
 - d. None of the answers is correct.
11. If $P(A) = .5$ and $P(B) = .5$, then $P(A \cap B)$ -----.
- a. is 0
 - b. is .25
 - c. is 1
 - d. cannot be determined from the information given
12. If A and B are independent events with $P(A) = .4$ and $P(B) = .6$, then $P(A \cap B) =$ -----.
- a. .76
 - b. 1
 - c. .24
 - d. .2
13. A couple has three children. Assuming each child has an equal chance of being a boy or a girl, what is the probability that they have at least one girl?
- a. .125
 - b. .5
 - c. .875
 - d. 1
14. The probability of an event is -----.
- a. the sum of the probabilities of the sample points in the event
 - b. the product of the probabilities of the sample points in the event
 - c. the minimum of the probabilities of the sample points in the event
 - d. the maximum of the probabilities of the sample points in the event
15. If $P(A) = .6$, $P(B) = .3$, and $P(A \cap B) = .2$, then $P(B | A) =$ -----.

- a. .33
- b. .5
- c. .67
- d. .9

16. All the employees of ABC Company are assigned ID numbers. The ID number consists of the first letter of an employee's last name, followed by four numbers.

- a. How many possible different ID numbers are there?
- b. How many possible different ID numbers are there for employees whose last name starts with an A?

17. A student has to take seven more courses before she can graduate. If none of the courses are prerequisites to others, how many groups of three courses can she select for the next semester?

18. Assume that in your hand you hold an ordinary six-sided die and a dime. You toss both the die and the dime on a table.

- a. What is the probability that a head appears on the dime and a 6 on the die?
- b. What is the probability that a tail appears on the dime and any number more than 3 on the die?
- c. What is the probability that a number larger than 2 appears on the die?

19. A very short quiz has one multiple-choice question with five possible choices (a, b, c, d, e) and one true or false question. Assume you are taking the quiz but do not have any idea what the correct answer is to either question, but you mark an answer anyway.

- a. What is the probability that you have given the correct answer to both questions?
- b. What is the probability that only one of the two answers is correct?
- c. What is the probability that neither answer is correct?
- d. What is the probability that only your answer to the multiple-choice question is correct?
- e. What is the probability that you have only answered the true or false question correctly?

20. Two of the cylinders in an eight-cylinder car are defective and need to be replaced. If two cylinders are selected at random, what is the probability that

- a. both defective cylinders are selected?
- b. no defective cylinder is selected?
- c. at least one defective cylinder is selected?

21. Sixty percent of the student body at UTC is from the state of Tennessee (T), 30% is from other states (O), and the remainder is international students (I). Twenty percent of students from Tennessee lives in the dormitories, whereas 50% of students from other states lives in the dormitories. Finally, 80% of the international students live in the dormitories.

- a. What percentage of UTC students lives in the dormitories?
- b. Given that a student lives in the dormitory, what is the probability that she/he is an international student?
- c. Given that a student does not live in the dormitory, what is the probability that she/he is an international student?

22. As a company manager for Claimstat Corporation there is a .40 probability that you will be promoted this year. There is a .72 probability that you will get a promotion or a raise. The probability of getting a promotion and a raise is .25.

- a. If you get a promotion, what is the probability that you will also get a raise?
- b. What is the probability of getting a raise?
- c. Are getting a raise and being promoted independent events? Explain using probabilities.
- d. Are these two events mutually exclusive? Explain using probabilities.

23. 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?

24. A machine is used in a production process. From past data, it is known that 97% of the time the machine is set up correctly. Furthermore, it is known that if the machine is set up correctly, it produces 95% acceptable (non-defective) items. However, when it is set up incorrectly, it produces only 40% acceptable items.

- a. An item from the production line is selected. What is the probability that the selected item is non-defective?
- b. Given that the selected item is non-defective, what is the probability that the machine is set up correctly?
- c. What method of assigning probabilities was used here?

25. 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: You have been given two conditional probabilities.)

- 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?

26. A numerical description of the outcome of an experiment is called a _____.

- a. descriptive statistic
- b. probability function
- c. variance
- d. random variable

27. A description of how the probabilities are distributed over the values the random variable can assume is called a(n) -----.
- probability distribution
 - probability function
 - random variable
 - expected value
28. A weighted average of the value of a random variable, where the probability function provides weights, is known as -----.
- a probability function
 - a random variable
 - the expected value
 - None of the answers is correct.
29. The expected value of a random variable is the -----.
- value of the random variable that should be observed on the next repeat of the experiment
 - value of the random variable that occurs most frequently
 - square root of the variance
 - None of the answers is correct.

Exhibit 5-3

The probability distribution for the number of goals the Lions soccer team makes per game is given below.

Number of Goals	Probability
0	.05
1	.15
2	.35
3	.30
4	.15

30. Refer to Exhibit 5-3. The expected number of goals per game is -----.
- 0
 - 1
 - 2
 - 2.35
31. Refer to Exhibit 5-3. What is the probability that in a given game the Lions will score less than 3 goals?
- .85
 - .55
 - .45
 - .80
32. Which of the following is a characteristic of a binomial experiment?
- At least two outcomes are possible.
 - The probability of success changes from trial to trial.

- c. The trials are independent.
 - d. All of the answers are correct.
33. A probability distribution showing the probability of x successes in n trials, where the probability of success does not change from trial to trial, is termed a _____.
- a. uniform probability distribution
 - b. binomial probability distribution
 - c. hypergeometric probability distribution
 - d. normal probability distribution
34. The binomial probability distribution is used with _____.
- a. a continuous random variable
 - b. a discrete random variable
 - c. any distribution, as long as it is not normal
 - d. All of the answers are correct.
35. Assume that you have a binomial experiment with $p = 0.5$ and a sample size of 100. The expected value of this distribution is _____.
- a. 0.50
 - b. 0.30
 - c. 50
 - d. Not enough information is given to answer this question.
36. Twenty percent of the students in a class of 100 are planning to go to graduate school. The standard deviation of this binomial distribution is _____.
- a. 20
 - b. 16
 - c. 4
 - d. 2

Exhibit 5-9

Forty percent of all registered voters in a national election are female. A random sample of 5 voters is selected.

37. Refer to Exhibit 5-9. The probability that the sample contains 2 female voters is _____.
- a. .0778
 - b. .7780
 - c. .5000
 - d. .3456

Exhibit 5-11

The random variable x is the number of occurrences of an event over an interval of 10 minutes. It can be assumed the probability of an occurrence is the same in any two time periods of an equal length. It is known that the mean number of occurrences in 10 minutes is 5.3.

38. Refer to Exhibit 5-11. The probability there are 8 occurrences in 10 minutes is _____.
- a. .0241

- b. .0771
- c. .1126
- d. .9107

39. Refer to Exhibit 5-11. The probability there are less than 3 occurrences is _____.

- a. .0659
- b. .0948
- c. .1016
- d. .1239

40. In a binomial experiment consisting of five trials, the number of different values that x (the number of successes) can assume is _____.

- a. 2
- b. 5
- c. 6
- d. 10

41. For the following probability distribution:

x	$f(x)$
0	.01
1	.02
2	.10
3	.35
4	.20
5	.11
6	.08
7	.05
8	.04
9	.03
10	.01

- a. Determine $E(x)$.
- b. Determine the variance.
- c. Determine the standard deviation.

42. The demand for a product varies from month to month. Based on the past year's data, the following probability distribution shows MNM company's monthly demand.

x	$f(x)$
Unit Demand	Probability
0	.10
1,000	.10
2,000	.30
3,000	.40
4,000	.10

- a. Determine the expected number of units demanded per month.

b. Each unit produced costs the company \$8.00, and is sold for \$10.00. How much will the company gain or lose in a month if it stocks the expected number of units demanded, but sells 2000 units?

43. The random variable x has the following probability distribution:

x	$f(x)$
0	.25
1	.20
2	.15
3	.30
4	.10

a. Is this probability distribution valid? Explain and list the requirements for a valid probability distribution.

- b. Calculate the expected value of x .
- c. Calculate the variance of x .
- d. Calculate the standard deviation of x .

44. The records of a department store show that 20% of its customers who make a purchase return the merchandise to exchange it. In the next 6 purchases,

- a. what is the probability that 3 customers will return the merchandise for exchange?
- b. what is the probability that 4 customers will return the merchandise for exchange?
- c. what is the probability that none of the customers will return the merchandise for exchange?

45. Twenty percent of the applications received for a position are rejected. What is the probability that among the next 14 applications,

- a. none will be rejected?
- b. all will be rejected?
- c. less than 2 will be rejected?
- d. more than 4 will be rejected?
- e. Determine the expected number of rejected applications and its variance.

46. In a large university, 75% of students live in the dormitories. A random sample of 5 students is selected.

- a. Define the random variable in words for this experiment.
- b. What is the probability that the sample contains exactly 3 students who live in the dormitories?
- c. What is the probability that the sample contains no students who live in the dormitories?
- d. What is the probability that the sample contains more than 3 students who do not live in the dormitories?
- e. What is the expected number of students (in the sample) who do not live in the dormitories?

47. The student body of a large university consists of 30% Business majors. A random sample of 20 students is selected.

- a. Define the random variable in words for this experiment.

- b. What is the probability that among the students in the sample at least 10 are Business majors?
- c. What is the probability that at least 16 are not Business majors?
- d. What is the probability that exactly 10 are Business majors?
- e. What is the probability that exactly 12 are not Business majors?

48. A local university reports that 3% of its students take their general education courses on a pass/fail basis. Assume that 50 students are registered for a general education course.

- a. Define the random variable in words for this experiment.
- b. What is the expected number of students who have registered on a pass/fail basis?
- c. What is the probability that exactly 5 are registered on a pass/fail basis?
- d. What is the probability that more than 3 are registered on a pass/fail basis?
- e. What is the probability that less than 4 are registered on a pass/fail basis?

49. Twenty-five percent of the employees of a large company are minorities. A random sample of 7 employees is selected.

- a. Define the random variable in words for this experiment.
- b. What is the probability that the sample contains exactly 4 minorities?
- c. What is the probability that the sample contains fewer than 2 minorities?
- d. What is the probability that the sample contains exactly 1 non-minority?
- e. What is the expected number of minorities in the sample?
- f. What is the variance of the minorities?