

Study Guide and Review - Chapter 11

Choose a term from the list above that best completes each statement.

1. A(n) _____ for a particular random variable is a function that maps the sample space to the probabilities of the outcomes of the sample space.

ANSWER:

probability distribution

2. A(n) _____ is an error that results in a misrepresentation of members of a population.

ANSWER:

bias

3. In a statistical study, data are collected and used to answer questions about a population characteristic or _____.

ANSWER:

parameter

4. The _____ can be used to determine the area under the normal curve at specific intervals.

ANSWER:

Empirical Rule

5. In a(n) _____, members of a sample are measured or observed without being affected by the study.

ANSWER:

observational study

6. A _____ is an estimate of a population parameter stated as a range with a specific degree of certainty.

ANSWER:

confidence interval

Determine whether each situation describes a survey, an experiment, or an observational study. Then identify the sample, and suggest a population from which it may have been selected.

7. **SHOPPING** Every tenth shopper coming out of a store is asked questions about his or her satisfaction with the store.

ANSWER:

survey; sample: every tenth shopper; population: all potential shoppers

8. **MILK SHAKE** A fast food restaurant gives 25 of their customers a sample of a new milk shake and employees monitor their reactions as they taste it.

ANSWER:

observational study; sample: the 25 customers; population: all potential customers

9. **SCHOOL** Every fifth person coming out of a high school is asked what their favorite class is.

ANSWER:

survey; sample: every fifth person; population: student body

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10. **DOGSLED** The Iditarod is a race across Alaska. The table shows the winning times, in days, for recent years.

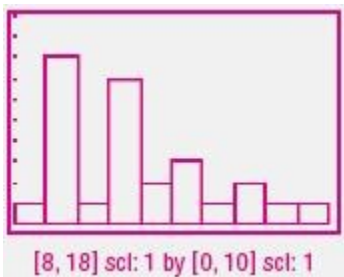
Iditarod Winning Times

9.1, 9.4, 10.3, 9.3, 9.6, 8.7, 9.5, 9.4, 9.2, 17.3, 15.4, 15.5, 14.2, 12.0, 16.6, 13.5, 13.0, 18.1, 12.4, 11.6, 11.5, 11.3, 11.3, 13.1, 11.2, 11.6, 11.6, 9.7

- a. Use a graphing calculator to create a histogram. Then describe the shape of the distribution.
b. Describe the center and spread of the data using either the mean and standard deviation or the five-number summary. Justify your choice.

ANSWER:

a.



positively skewed

- b. Sample answer: The distribution is skewed, so use the five-number summary. The values range from 8.7 to 18.1 days. The median is 11.55 days, and half of the data are between 9.55 and 13.3 days.

11. **SWIMMING** Kelly's practice times in the 400-meter individual medley are shown in the table.

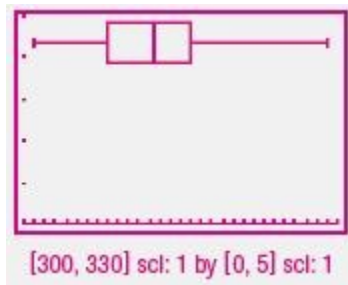
Times in Seconds

301, 311, 320, 308, 312, 307, 303, 305, 309, 308, 304, 302, 311, 313, 313, 316, 314, 306, 329, 326, 319, 310, 306, 309, 320, 318, 315, 318, 314, 309,

- a. Use a graphing calculator to create a box-and-whisker plot. Then describe the shape of the distribution.
b. Describe the center and spread of the data using either the mean and standard deviation or the five-number summary. Justify your choice.

ANSWER:

a.



positively skewed

- b. Sample answer: The distribution is skewed, so use the five-number summary. Kelly's times range from 301 to 329 seconds. The median is 311, and half of the data are between 307 and 316 seconds.

Identify the random variable in each distribution, and classify it as *discrete* or *continuous*. Explain your reasoning.

12. the number of ice cream sandwiches sold at an ice cream shop

ANSWER:

The random variable X is the number of ice cream sandwiches sold. The number of ice cream sandwiches countable, so X is discrete.

13. the time it takes to run a 5-kilometer race

ANSWER:

The random variable X is the time it takes to run the race. Time can be anywhere within a certain range. Therefore, X is continuous.

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14. **DANCE RECITALS** The probability distribution lists the probable number of dance recitals per year at Rena's Dance School. Determine the expected number of dance recitals per year.

Number of Dance Recitals Per Year					
Recitals	0	1	2	3	4
Probability	0.3	0.3	0.13	0.13	0.14

ANSWER:

1.51

15. **SNOW DAYS** The distribution lists the number of snow days per year at Washington Elementary over the past 26 years. Determine the expected number of snow days this year.

Number of Snow Days Per Year					
Snow Days	0	1	2	3	4
Frequency	4	8	6	3	5

ANSWER:

1.88 snow days

Determine whether each experiment is a binomial experiment or can be reduced to a binomial experiment. If so, describe a trial, determine the random variable, and state n, p , and q .

16. A survey found that 30% of adults like chocolate ice cream more than any other flavor. You ask 35 adults if they prefer chocolate ice cream more than any other flavor.

ANSWER:

This experiment can be reduced to a binomial experiment. Success is yes, failure is no, a trial is asking an adult, and the random variable is the number of yeses; $n = 35, p = 0.30, q = 0.70$.

17. Thirty random guests from Sheila's birthday party are asked their favorite song.

ANSWER:

This experiment cannot be reduced to a binomial experiment because there are more than two possible outcomes.

18. **WATCHES** According to an online poll, 74% of adults wear watches. Timmy surveyed 25 random adults. What is the probability that 20 of the adults surveyed wear a watch?

ANSWER:

15.3%

19. **SEASONS** Of 1108 people surveyed, 68% say that summer is their favorite season. What is the probability that at least 15 of 20 randomly selected people will prefer summer

ANSWER:

34.3%

20. **RUNNING TIMES** The times in the 40-meter dash for a select group of professional football players are normally distributed with a mean of 4.74 seconds and a standard deviation of 0.13 second.

a. About what percent of players have times between 4.6 and 4.8 seconds?

b. About how many of a sample of 800 players will have times below 4.5 seconds?

ANSWER:

a. 53.7%

b. about 26 players

21. **ATTENDANCE** The number of tickets sold at high school basketball games in a particular conference are normally distributed with a mean of 68.7 and a standard deviation of 13.1.

a. About what percent of the games sell fewer than 75 tickets?

b. About how many of a sample of 200 games will sell more than 100 tickets?

ANSWER:

a. 68.5%

b. about 2 games

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22. **COMMUTING** The number of minutes it takes Phil to commute to work each day are normally distributed with a mean of 18.6 and a standard deviation of 3.5.
- About what percent of the time will it take Phil more than 20 minutes to commute to work?
 - About how many of a sample of 50 days will it take Phil less than 15 minutes to commute to work?

ANSWER:

- 34.5%
 - about 8 days
23. **INTERNET** A sample of 300 students was asked the average amount of time they spend online during a weeknight. The mean time was 64.3 minutes with a standard deviation of 7.3 minutes. Determine a 95% confidence interval.

ANSWER:

$$63.5 \leq \bar{x} \leq 65.1$$

Identify the null and alternative hypotheses for each statement. Then identify the statement that represents the claim.

24. A cupcake shop owner says that they sell 200 cupcakes everyday.

ANSWER:

$$H_0: \mu = 200 \text{ (claim); } H_a: \mu \neq 200$$

25. A technician says that it takes at least 45 minutes to diagnose a computer problem.

ANSWER:

$$H_0: \mu \geq 45 \text{ (claim); } H_a: \mu < 45$$

26. A member of a swim team says that she practices no more than 35 minutes on Mondays.

ANSWER:

$$H_0: \mu \leq 35 \text{ (claim); } H_a: \mu > 35$$