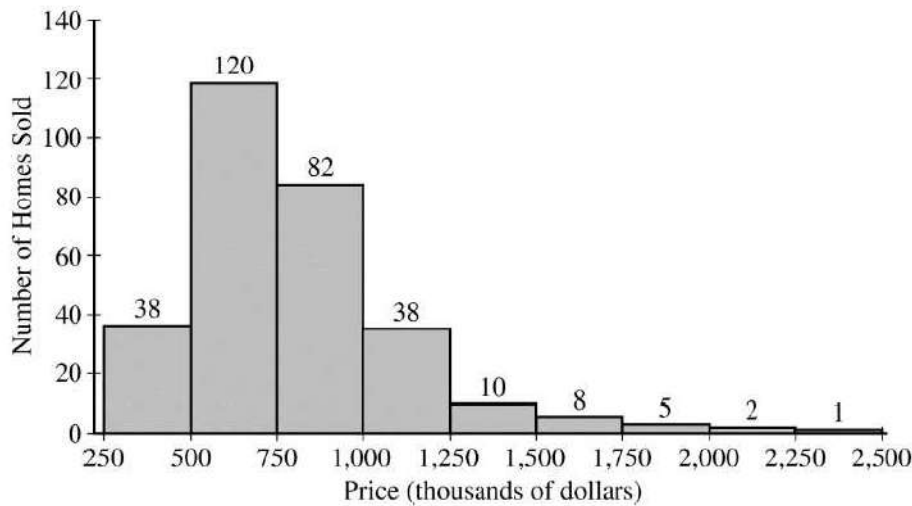1. The prices, in thousands of dollars, of 304 homes recently sold in a city are summarized in the histogram below.

Based on the histogram, which of the following statements must be true?

(A) The minimum price is $250,000.

(B) The maximum price is $2,500,000.

(C) The median price is not greater than $750,000.

(D) The mean price is between $500,000 and $750,000.

(E) The upper quartile of the prices is greater than $1,500,000.

2. As part of a study on the relationship between the use of tanning booths and the occurrence of skin cancer, researchers reviewed the medical records of 1,436 people. The table below summarizes tanning booth use for people in the study who did and did not have skin cancer.

	Used a Tanning Booth	Did Not Use a Tanning Booth	Total
Skin cancer	190	706	896
No skin cancer	75	465	540
Total	265	1,171	1,436

Of the people in the study who had skin cancer, what fraction used a tanning booth?

(A) $\dfrac{190}{265}$

(B) $\dfrac{190}{896}$

(C) $\dfrac{190}{1,436}$

(D) $\dfrac{265}{1,436}$

(E) $\dfrac{896}{1,436}$

3. A researcher is conducting a study of charitable donations by surveying a simple random sample of households in a certain city. The researcher wants to determine whether there is convincing statistical evidence that more than 50 percent of households in the city gave a charitable donation in the past year. Let p represent the proportion of all households in the city that gave a charitable donation in the past year. Which of the following are appropriate hypotheses for the researcher?

(A) $H_0 : p = 0.5$ and $H_a : p > 0.5$

(B) $H_0 : p = 0.5$ and $H_a : p \neq 0.5$

(C) $H_0 : p = 0.5$ and $H_a : p < 0.5$

(D) $H_0 : p > 0.5$ and $H_a : p \neq 0.5$

(E) $H_0 : p > 0.5$ and $H_a : p = 0.5$

4. A company determines the mean and standard deviation of the number of sick days taken by its employees in one year. Which of the following is the best description of the standard deviation?

(A) Approximately the mean distance between the number of sick days taken by individual employees and the mean number of sick days taken by all employees

(B) Approximately the median distance between the number of sick days taken by individual employees and the median number of sick days taken by all employees

(C) The distance between the greatest number of sick days taken by an employee and the mean number of sick days taken by all employees

(D) The number of days separating the fewest sick days taken and the most sick days taken when considering all employees

(E) The number of days separating the fewest sick days taken and the most sick days taken when considering the middle 50 percent of the distribution

5. In one region of the country, the mean length of stay in hospitals is 5.5 days with standard deviation 2.6 days. Because many patients stay in the hospital for considerably more days, the distribution of length of stay is strongly skewed to the right. Consider random samples of size 100 taken from the distribution with the mean length of stay, $\bar{x}$, recorded for each sample. Which of the following is the best description of the sampling distribution of $\bar{x}$?

(A) Strongly skewed to the right with mean 5.5 days and standard deviation 2.6 days

(B) Strongly skewed to the right with mean 5.5 days and standard deviation 0.26 day

(C) Strongly skewed to the right with mean 5.5 days and standard deviation 0.026 day

(D) Approximately normal with mean 5.5 days and standard deviation 2.6 days

(E) Approximately normal with mean 5.5 days and standard deviation 0.26 day

6. A local television news station includes a viewer survey question about a current issue at the beginning of every evening news broadcast. Viewers are invited to use social media to respond to the question. The results of the survey are shared with the audience at the end of each broadcast. In relation to the opinions of the population of the region, which of the following is a possible reason why the results of such surveys could be biased?

    I. Viewers with strong opinions about the current issue are more likely to respond than are viewers without strong opinions.

    II. The opinions of viewers of one television station are not necessarily representative of the population of a region.

    III. Viewers with access to social media are not necessarily representative of the population of a region.

(A) I only

(B) II only

(C) III only

(D) II and III only

(E) I, II, and III

7. A graduate student conducted a study of field mice in rural Kansas. The student obtained a sample of 100 field mice and recorded the weight, in grams, of each mouse. After the measurements were taken, it was discovered that the scale was not calibrated correctly. The student adjusted the 100 recorded measurements by subtracting 3 grams from each measurement. Which of the following statistics for the weight, in grams, of the field mice has the same value before and after the adjustment?

(A) The median

(B) The mean

(C) The first quartile

(D) The third quartile

(E) The interquartile range

8. A statistician proposed a new method for constructing a 90 percent confidence interval to estimate the median of assessed home values for homes in a large community. To test the method, the statistician will conduct a simulation by selecting 10,000 random samples of the same size from the population. For each sample, a confidence interval will be constructed using the new method. If the confidence level associated with the new method is actually 90 percent, which of the following will be captured by approximately 9,000 of the confidence intervals constructed from the simulation?

(A) The sample mean

(B) The sample median

(C) The sample standard deviation

(D) The population mean

(E) The population median

9. The distribution of monthly rent for one-bedroom apartments in a city is approximately normal with mean $936 and standard deviation $61. A graduate student is looking for a one-bedroom apartment and wants to pay no more than $800 in monthly rent. Of the following, which is the best estimate of the percent of one-bedroom apartments in the city with a monthly rent of at most $800 ?

(A) 1.3%

(B) 2.5%

(C) 50%

(D) 95%

(E) 97.5%

10. A news article reported that college students who have part-time jobs work an average of 15 hours per week. The staff of a college newspaper thought that the average might be different from 15 hours per week for their college. Data were collected on the number of hours worked per week for a random sample of students at the college who have part-time jobs. The data were used to test the hypotheses

$$H_0 : \mu = 15$$
$$H_a : \mu \neq 15,$$

where μ is the mean number of hours worked per week for all students at the college with part-time jobs. The results of the test are shown in the table below.

Sample Mean	Std Error	df	t-stat	p-value
13.755	0.707	25	−1.761	0.090

Assuming all conditions for inference were met, which of the following represents a 95 percent confidence interval for μ ?

(A) 13.755 ± 0.244

(B) 13.755 ± 0.286

(C) 13.755 ± 0.707

(D) 13.755 ± 1.245

(E) 13.755 ± 1.456

11. A team of psychologists studied the effect of multitasking on the completion of cognitive tasks. A group of 40 women participated in the study. Each woman owned a smartphone equipped with the same type of keyboard. The women typed a text passage on the phone twice, one time while sitting in a quiet room (a single task) and the other time while walking (a multitask). The order of the single task and the multitask was randomly determined for each woman. The psychologists recorded the time it took each woman to type the text for both tasks. If the conditions of inference are met, which of the following tests is most appropriate to analyze the data?

(A) A two-sample t-test for a difference between means

(B) A matched-pairs t-test for a mean difference

(C) A one-sample z-test for a proportion

(D) A two-sample z-test for a difference between proportions

(E) A chi-square test of independence