Elementary Statistics

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Math

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Short Answer | Step-by-step Solution

Chapter 2: Q11 (page 49)

Constructing Frequency Distributions. In Exercises 11–18, use the indicated data to construct the frequency distribution. (The data for Exercises 13–16 can be downloaded at TriolaStats.com.)

Old Faithful Listed below are sorted duration times (seconds) of eruptions of the Old Faithful geyser in Yellowstone National Park. Use these times to construct a frequency distribution. Use a class width of 25 seconds and begin with a lower class limit of 125 seconds.

125 203 205 221 225 229 233 233 235 236 236 237 238 238 239 240 240 240 240 241 241 242 242 242 243 243 244 245 245 245 245 246 246 248 248 248 249 249 250 251 252 253 253 255 255 256 257 258 262 264

Short Answer

Expert verified

The following frequency distribution is constructed for the eruption times (in seconds):

Eruption times (seconds)	Frequency
125-149	1
150-174	0
175-199	0
200-224	3
225-249	34
250-274	12

Step by step solution

01

Given information

Data are given on the duration of eruptions of the Old Faithful geyser in Yellowstone National Park.

02 Frequency distribution

A frequency distribution is an arrangement of data values in the form of closed intervals.

The frequencies of each class interval are tabulated by counting the number of data values that fall in each interval.

03 Construction

The minimum value in the data is equal to 125 seconds.

The maximum value in the data is equal to264 seconds.

The first lower limit is equal to 125 seconds.

Class width = 25 seconds.

The number of class intervals required is computed below.

Therefore, the total number of class intervals in the frequency distribution is equal to 6.

$$\text{Numberofclasses} = \frac{\text{Maximumvalue} - \text{Minimumvalue}}{\text{Classwidth}} = \frac{264-125}{25} = 5.56 \approx 6$$

According to the given formula, the lower class limits of the 6 intervals are computed below.

$$\text{Classwidth} = \text{Differencebetween2consecutivelowerclasslimits}$$

$$1^{st}\text{lowerclasslimit} = 1252^{nd}\text{lowerclasslimit} = 125 + 25 = 150$$

$$3^{rd}\text{lowerclasslimit} = 150 + 25 = 1754^{th}\text{lowerclasslimit} = 175 + 25 = 200$$

$$5^{th}\text{lowerclasslimit} = 200 + 25 = 2256^{th}\text{lowerclasslimit} = 225 + 25 = 250$$

Considering a gap of 1 unit between each successive interval, the following upper class limits are constructed:

$$1^{st}\text{upperclasslimit} = 2^{nd}\text{lowerclasslimit} - 1 = 150 - 1 = 149$$

$$2^{nd}\text{upperclasslimit} = 3^{rd}\text{lowerclasslimit} - 1 = 175 - 1 = 174$$

$$3^{rd}\text{upperclasslimit} = 4^{th}\text{lowerclasslimit} - 1 = 200 - 1 = 199$$

$$4^{th}\text{upperclasslimit} = 5^{th}\text{lowerclasslimit} - 1 = 225 - 1 = 224$$

$$5^{th}\text{upperclasslimit} = 6^{th}\text{lowerclasslimit} - 1 = 250 - 1 = 249$$

$$6^{th}\text{upperclasslimit} = 7^{th}\text{lowerclasslimit} - 1 = 275 - 1 = 274$$

By counting the durationsthat fall in each interval (both limits inclusive), the following frequency distribution is constructed:

Eruption times (seconds)	Frequency
125-149	1
150-174	0
175-199	0
200-224	3
225-249	34
250-274	12

Most popular questions from this chapter

Seatbelts A histogram is to be constructed from the measured breaking points (in pounds) of tested car seatbelts. Identify two key features of a histogram of those values that would suggest that the data have a normal distribution.

P-Values In Exercises 13–16, write a statement that interprets the P-value and includes a conclusion about linear correlation.

Using the data from Exercise 8 “Heights of Fathers and Sons,” the P-value is 0.963.

Pie Charts. In Exercises 13 and 14, construct the pie chart.

Journal Retractions Use the data from Exercise 11 “Journal Retractions.”

Body Temperatures Listed below are the temperatures from nine males measured at 8 AM and again at 12 AM (from Data Set 3 “Body Temperatures” in Appendix B). Construct a scatterplot. Based on the graph, does there appear to be a relationship between 8 AM temperatures and 12 AM temperatures?

8 AM	12AM
98	98
97	97.6
98.6	98.8
97.4	98
97.4	98.8
98.2	98.8
98.2	97.6

96.6	98.6
97.4	98.6

Environment

a. After collecting the average (mean) global temperatures for each of the most recent 100 years, we want to construct the graph that is most appropriate for these data. Which graph is the best?

b. After collecting the average (mean) global temperature and the amount of carbon monoxide emissions for the most recent 100 years, we want to construct a graph to investigate the association between those two variables. Which graph is the best?

c. An investigation of carbon monoxide sources includes motor vehicles, furnaces, fires, coal-burning power plants, and tobacco smoke. If we want to construct a graph that illustrates the relative importance of these sources, which graph is the best?

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