

Solution 2.12

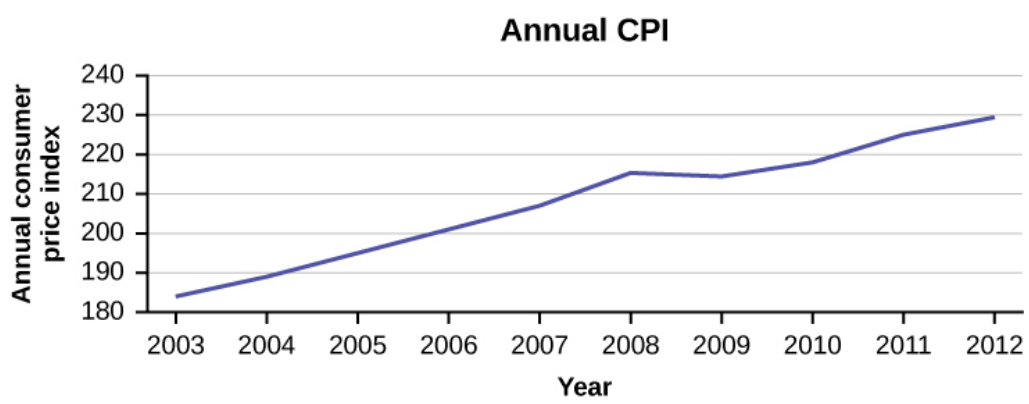


Figure 2.10

Try It Σ

2.12 The following table is a portion of a data set from www.worldbank.org. Use the table to construct a time series graph for CO₂ emissions for the United States.

CO2 Emissions			
	Ukraine	United Kingdom	United States
2003	352,259	540,640	5,681,664
2004	343,121	540,409	5,790,761
2005	339,029	541,990	5,826,394
2006	327,797	542,045	5,737,615
2007	328,357	528,631	5,828,697
2008	323,657	522,247	5,656,839
2009	272,176	474,579	5,299,563

Table 2.20

Uses of a Time Series Graph

Time series graphs are important tools in various applications of statistics. When recording values of the same variable over an extended period of time, sometimes it is difficult to discern any trend or pattern. However, once the same data points are displayed graphically, some features jump out. Time series graphs make trends easy to spot.

2.3 | Measures of the Location of the Data

The common measures of location are **quartiles** and **percentiles**

Quartiles are special percentiles. The first quartile, Q_1 , is the same as the 25th percentile, and the third quartile, Q_3 , is the same as the 75th percentile. The median, M , is called both the second quartile and the 50th percentile.

To calculate quartiles and percentiles, the data must be ordered from smallest to largest. Quartiles divide ordered data into quarters. Percentiles divide ordered data into hundredths. To score in the 90th percentile of an exam does not mean, necessarily, that you received 90% on a test. It means that 90% of test scores are the same or less than your score and 10% of the test scores are the same or greater than your test score.

Percentiles, Quartiles, Median.

- Median

we numbered our observations

data values

halfway between #0 and #11 is

$$\frac{\#0 + \#11}{2} = \#5.5$$

0	10
1	13
2	18
3	20
4	22
5	31
6	38
7	44
8	59
9	80
10	84
11	97

1st Quartile Q_1 is the median of the bottom half of the data.

$$\frac{\#0 + \#5}{2} = \#2.5$$

$$\frac{18 + 20}{2} = 19 = Q_1$$

median is between here

$$M = \frac{31 + 38}{2} = 34.5 = M$$

3rd Quartile Q_3 is the median of top half data.

$$\frac{\#6 + \#11}{2} = \#8.5$$

$$\frac{59 + 80}{2} = 69.5 = Q_3$$

quartiles for same data set

- 5 number Summary for the same dataset example as above

<u>10</u>	<u>19</u>	<u>34.5</u>	<u>69.5</u>	<u>97</u>
min	Q_1	M	Q_3	max

make sure these are the data values

Example 2 Find 5 number summary.

Median

$$\frac{\#0 + \#50}{2} = \#25 = 43_{\text{yrs}} = M$$

our data set is 51 observations, each is the age of a randomly sampled person

#	0	10	20	30	40
0	0 yr	18	34	55	59
1	3 yr	18	34	55	61
2	3 yr	19 yr	34	55	61
3	3 yr	22	36	56	62
4	4 yr	26	42	56	63
5	8	27	43 yr	57	67
6	12	29	47	57	68
7	13	30	48	58	68
8	14	32	54	58	69
9	16	32	54	59	71

Q₁

$$\frac{\#0 + \#24}{2} = \#12 = 19_{\text{yrs}} = Q_1$$

Q₃

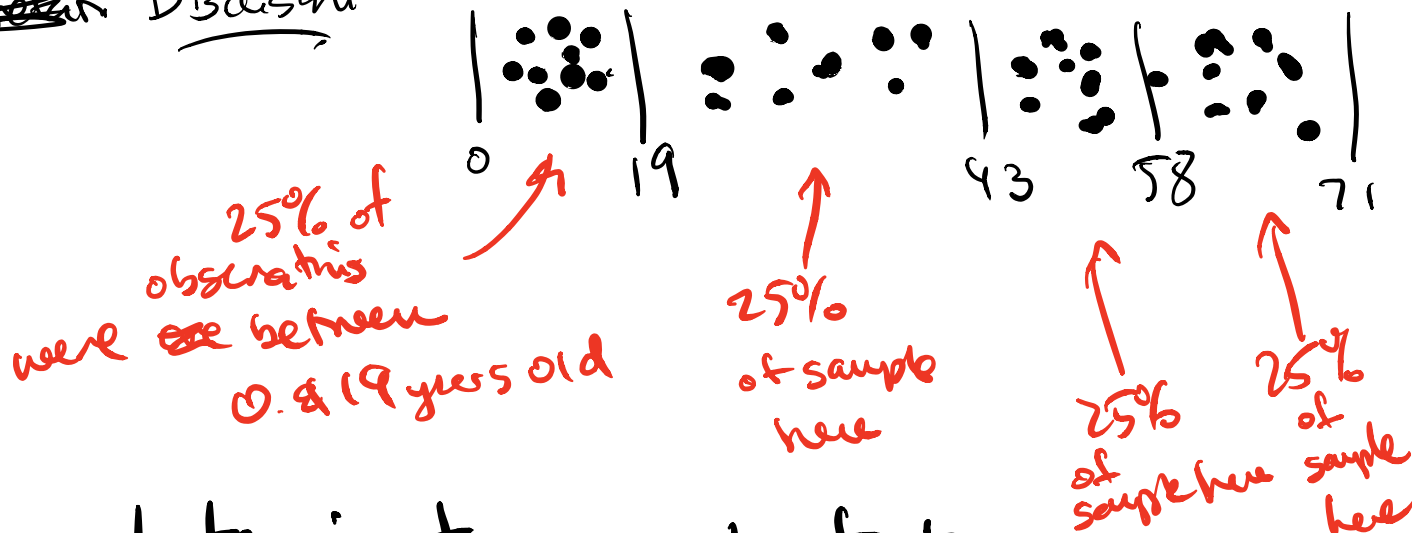
$$\frac{\#26 + \#50}{2} = \#38 = 58$$

this means
~25% of
our sample
is ≤ 19 years old

$$Q_3 = 58_{\text{yrs}}$$

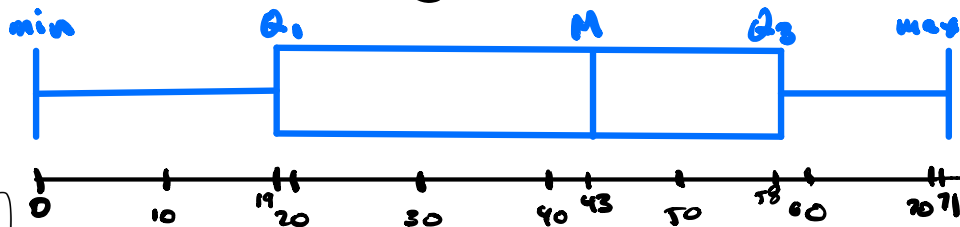
5 number summary is: 0 yrs, 19 yrs, 43 yrs, 58 yrs, 71 yrs

Interpret DBars



A Box plot: just a graph of the 5 number summary.

The boxplot for example 2:



5 number summary is: 0 yrs, 19 yrs, 43 yrs, 58 yrs, 71 yrs

4 Inter Quartile Range IQR

Example 2: we've already computed

5 number summary: 0, 19, 43, 58, 71

Definition

$$IQR = Q_3 - Q_1$$

Example 2: $58 - 19 =$

$$39_{\text{yrs}} = IQR$$

because
our data
was years