Answers to Exercises

Chapter 1

Section 1.2　　11，14，20

Section 1.3　　34，40

Section 1.4　　44，56

11.

6L	034	
6H	667899	
7L	00122244	
7H		stem: tens
8L	001111122344	leaf : ones
8H	5557899	
9L	03	
9H	58	

This display brings out the gap in the data—there are no scores in the high 70's.

14.

a.

2	23	stem: 1.0
3	2344567789	leaf: .10
4	01356889	
5	00001114455666789	
6	000012222334445666778999 9	
7	00012233455555668	
8	02233448	
9	012233335666788	
10	2344455688	
11	2335999	
12	37	
13	8	
14	36	
15	0035	
16		
17		
18	9	

b. A representative is around 7.0.

c. The data exhibit a moderate amount of variation (this is subjective).

d. No, the data is skewed to the right, or positively skewed.

e. The value 18.9 appears to be an outlier, being more than two stem units from the previous value.

20.

a. The following stem-and-leaf display was constructed:

0	123334555599	
1	00122234688	stem: thousands
2	1112344477	leaf: hundreds
3	0113338	
4	37	
5	23778	

A typical data value is somewhere in the low 2000's. The display is bimodal (the stem at 5 would be considered a mode, the stem at 0 another) and has a positive skew.

b. A histogram of this data, using classes boundaries of 0, 1000, 2000, …, 6000 is shown below. The proportion of subdivisions with total length less than 2000 is (12+11)/47 = .489, or 48.9%. Between 2000 and 4000, the proportion is (10+7)/47 = .362, or 36.2%. The histogram shows the same general shape as depicted by the stem-and-leaf in part (a).

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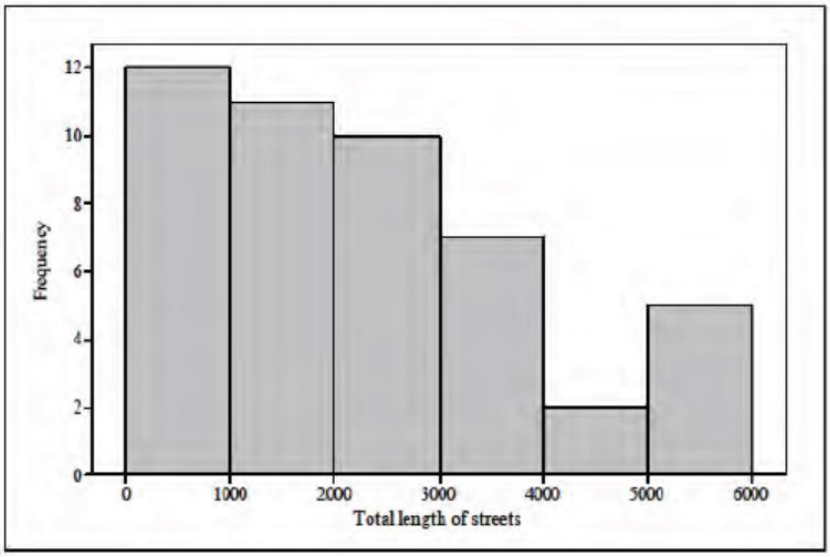

34.

a. For urban homes, $\bar{x} = 21.55$ EU/mg; for farm homes, $\bar{x} = 8.56$ EU/mg. The average endotoxin concentration in urban homes is more than double the average endotoxin concentration in farm homes.

b. For urban homes, $\tilde{x} = 17.00$ EU/mg; for farm homes, $\tilde{x} = 8.90$ EU/mg. The median endotoxin concentration in urban homes is nearly double the median endotoxin concentration in farm homes. The mean and median endotoxin concentration for urban homes are so different because the few large values, especially the extreme value of 80.0, raise the mean but not the median.

c. For urban homes, deleting the smallest ($x = 4.0$) and largest ($x = 80.0$) values gives a trimmed mean of $\bar{x}_{tr} = 153/9 = 17$ EU/mg. The corresponding trimming percentage is $100(1/11) \approx 9.1\%$. The trimmed mean is less than the mean of the entire sample, since the sample was positively skewed. Coincidentally, the median and trimmed mean are equal.

For farm homes, deleting the smallest ($x = 0.3$) and largest ($x = 21.0$) values gives a trimmed mean of $\bar{x}_{tr} = 107.1/13 = 8.24$ EU/mg. The corresponding trimming percentage is $100(1/15) \approx 6.7\%$. The trimmed mean is below, though not far from, the mean and median of the entire sample.

40. Sample median: 92

25% trimmed mean: 95.38

10% trimmed mean: 102.23

Sample mean:119.26

44.

a. range = 49.3 – 23.5 = 25.8

b.

x_i	$(x_i - \bar{x})$	$(x_i - \bar{x})^2$	x_i^2
29.5	–1.53	2.3409	870.25
49.3	18.27	333.7929	2430.49
30.6	–0.43	0.1849	936.36
28.2	–2.83	8.0089	795.24
28.0	–3.03	9.1809	784.00
26.3	–4.73	22.3729	691.69
33.9	2.87	8.2369	1149.21
29.4	–1.63	2.6569	864.36
23.5	–7.53	56.7009	552.25
31.6	0.57	0.3249	998.56
$\Sigma x_i = 310.3$	$\Sigma(x_i - \bar{x}) = 0$	$\Sigma(x_i - \bar{x})^2 = 443.801$	$\Sigma x_i^2 = 10072.41$

$$\bar{x} = 31.03\,;\; s^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1} = \frac{443.801}{9} = 49.3112$$

c. $s = \sqrt{49.3112} = 7.0222$

d. $s^2 = \dfrac{\Sigma x^2 - (\Sigma x)^2 / n}{n-1} = \dfrac{10072.41 - (310.3)^2/10}{9} = 49.3112$

56. The alcohol content distribution of this sample of 35 port wines is roughly symmetric except for two high outliers. The median alcohol content is 19.2% and the fourth spread is 1.42%. [upper fourth = (19.90 + 19.62)/2 = 19.76; lower fourth = (18.00 + 18.68)/2 = 18.34] The two outliers were 23.25% and 23.78%, indicating two port wines with unusually high alcohol content.