CHAPTER 1

Answers to Exercises 1.13–1.18

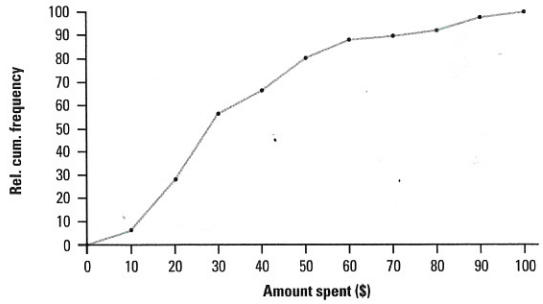
1.13 (a) The center corresponds to the 50th percentile.
(b) 9/50 = 0.18.
(c) See the *Teacher's Solutions Manual* for graph.

1.14 (a) See the *Teacher's Solutions Manual* for graphs. Note 359 mg/dl appears to be an outlier. Overall, glucose levels are not under control: only 4 of the 18 had levels in the desired range.
(b) See the *Teacher's Solutions Manual* for graph.
(c) About 25%. *Center:* about 148 mg/dl; 27.78% is associated with 130 mg/dl.

Exercises

1.13 Shopping spree, II Figure 1.15 is an ogive of the amount spent by grocery shoppers in Exercise 1.6 (page 48).

Figure 1.15 *Ogive of amount spent by grocery shoppers, for Exercise 1.13.*



(a) Estimate the center of this distribution. Explain your method.

(b) What is the relative cumulative frequency for the shopper who spent $17.00?

(c) Draw the histogram that corresponds to the ogive.

1.14 Glucose levels People with diabetes must monitor and control their blood glucose level. The goal is to maintain "fasting plasma glucose" between about 90 and 130 milligrams per deciliter (mg/dl) of blood. Here are the fasting plasma glucose levels for 18 diabetics enrolled in a diabetes control class, five months after the end of the class:[14]

141	158	112	153	134	95	96	78	148
172	200	271	103	172	359	145	147	255

(a) Make a stemplot of these data and describe the main features of the distribution. (You will want to round and also split stems.) Are there outliers? How well is the group as a whole achieving the goal for controlling glucose levels?

(b) Construct a relative cumulative frequency graph (ogive) for these data.

(c) Use your graph from part (b) to answer the following questions:

- What percent of blood glucose levels were between 90 and 130?
- What is the center of this distribution?
- What relative cumulative frequency is associated with a blood glucose level of 130?

1.15 Birthrates The table below shows the number of births in the United States and the birthrates at 10-year intervals from 1960 to 2000. The birthrate is the number of births per 1000 population.[15]

Year	Total number	Rate
1960	4,257,850	23.7
1970	3,731,386	18.4
1980	3,612,258	15.9
1990	4,092,994	16.7
2000	4,058,814	14.4

(a) Construct a time plot for the birthrate, 1960 to 2000.

(b) Is there a trend in the birthrate? If so, describe the trend in a sentence or two.

(c) List some factors that you think might explain what you see in your birthrate time plot.

(d) Construct a time plot for the total number of births.

(e) Describe what is happening over time for the total number of births.

(f) Briefly explain how you can have such different plots for the two variables.

1.16 Life expectancy Most people are aware that life expectancy, the number of years a person can expect to live, is much longer now than it was, say, a century ago. Here are the numbers for women provided by the National Center for Health Statistics.

Year	Life expectancy (female)	Year	Life expectancy (female)
1900	48.3	1960	73.1
1910	51.8	1970	74.7
1920	54.6	1980	77.5
1930	61.6	1990	78.8
1940	65.2	2000	79.5
1950	71.1		

(a) Construct a time plot for these data.

(b) Describe what you see about the life expectancy of females over the last hundred years.

1.17 The speed of light Light travels fast, but it is not transmitted instantaneously. Light takes over a second to reach us from the moon and over 10 billion years to reach us from the most distant objects observed so far in the expanding universe. Because radio and radar also travel at the speed of light, an accurate value for that speed is important in communicating with astronauts and orbiting satellites. An accurate value for the speed of light is also important to computer designers because electrical signals travel at light speed. The first reasonably accurate measurements of the speed of light were made over a hundred years ago by A. A. Michelson and Simon Newcomb. Table 1.5 contains 66 measurements made by Newcomb between July and September 1882.

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1.15 (a) See the *Teacher's Solutions Manual* for graph.
(b) Yes. The birthrate has clearly been decreasing since 1960.
(c) Better education, the increased use of contraceptives, and the possibility of legal abortion.
(d) See the *Teacher's Solutions Manual* for graph.
(e) The total number of births decreased from 1960 to 1980, increased drastically from 1980 to 1990, and stayed about the same in 2000.
(f) The two variables are measuring different things. Rate of births is not affected by a change in the population, but the total number of births is affected.

1.16 (a) See the *Teacher's Solutions Manual* for graph.
(b) The life expectancy of females has drastically increased over the last hundred years (from 48.3 to 79.5 years). The overall pattern is roughly linear.