7

CREATING EFFECTIVE CHARTS

PROBLEM SET

1. List what is missing from the charts in figures 7A and 7B.

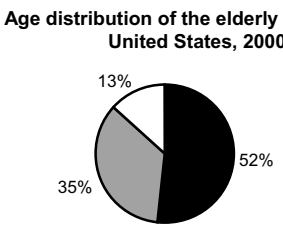

Figure 7A

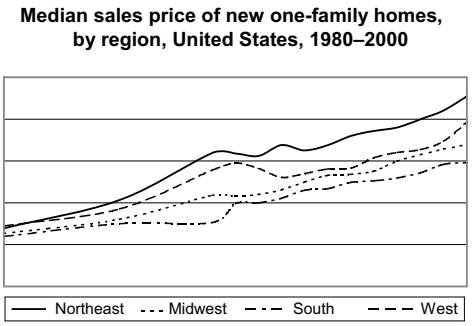

Figure 7B

2. Answer the following questions for figures 7.3, 7.5a, and 7.9 in *Writing about Numbers*, 2nd Edition.
    a. Who is described by the data?
    b. To what date or dates do the data pertain?
    c. Where were the data collected?
    d. What criteria were used to organize the values of the variables on chart axes? (*Hint*: Consider type of variable.)
    e. What are the units of measurement? Are they the same for all numbers shown in the chart?
    f. Are there footnotes to the chart? If so, why? If not, are any needed?
3. State which type of chart would be most appropriate for each of the following topics. Specify which variable goes on which axis, in the legend, as needed.
    a. Annual number of people receiving college degrees by gender, from 1990 to 2010.
    b. Average commuting costs per month, by mode of transportation (bicycle, bus, car, train, walk, other), US, 2010. (One number per type of transportation.)
    c. Current market share for Coca-Cola, Pepsi, and other cola brands.
    d. Distribution of SAT mathematics scores in 2013. (Range = 200 to 800 in increments of 10 points.)
    e. Type of contraceptive (condom, diaphragm, implant/injectable, oral contraceptive [the Pill], surgical sterilization, other, none) by 10-year age groups of women aged 15 to 45 in the United States in 2010. (Some women use more than one method.)
    f. Estimates of dates for each of 15 archeological artifacts, with margin of error for each estimate.

g. Relationship between systolic blood pressure (mm Hg) and percentage body fat for a sample of 150 elderly people in Norway, 2008.
h. Educational attainment distribution (< HS, = HS, > HS) for native-born United States residents and for immigrants from each of the following locations: other North American countries, Africa, Asia, Australia & New Zealand, Europe, and Latin America, 2010.
i. Trends in mean annual global temperature (°F) and carbon dioxide (CO_2) concentration (ppmv.) from 1960 to 2010.

4. Draw complete rough drafts of charts for two of the topics from the preceding question, complete with appropriate title, labels, and other features. Make up data to illustrate the interior part of the chart (e.g., trend lines, bars, slices, etc.).

5. For each of the topics in question 3, identify
   a. the number of variables to be presented;
   b. the types of variables to be presented (e.g., nominal, ordinal, interval, ratio);
   c. (for *XY* charts only) which principle you would use to decide what order to display values on the *x*-axis. See chapters 6 and 7 of *Writing about Numbers*, 2nd Edition, for a list of organizing principles.

6. Joe Schmoe is a Republican candidate for congress in his district. His campaign manager contracted a local survey firm to study opinions of major issues among his constituents. Results of the survey are shown in figure 7C.

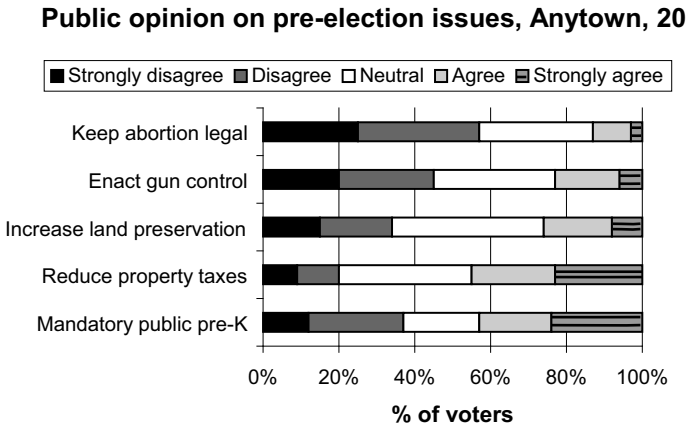

Figure 7C

   a. Which issues should he feature in his platform to maximize his chances in the primary election? Explain.
   b. Mr. Schmoe personally favors land preservation. Is that attitude likely to help or hurt him in the election?
   c. Would you characterize his district as liberal or conservative?

Use the information in table 7A to answer questions 7 through 10.

Table 7A. Total student aid and funds used to finance the postsecondary education expenses of undergraduates (in billions of 2012 $), academic years 1990–91 to 2010–11

	Total Federal Loans	Total Federal Grants	Institutional Grants	All other
1990–91	14.7	11.4	8.6	6.9
1994–95	24.8	12.1	11.6	8.1
1998–99	30.6	13.7	14.5	17.1
2002–03	37.2	19.5	17.2	27.6
2006–07	44.9	20.6	22.9	42.8
2010–11	74.7	50.8	31.8	43.2

Note: "All other" includes education tax benefits, private and employer grants, state grant programs, nonfederal loans, and federal work-study.

Source: College Board Advocacy and Policy Center, 2014. Trends in Student Aid 2013. Trends in Higher Education Series. Table 1A. Available online at https://trends.collegeboard.org/sites/default/files/student-aid-2013-full-report-140108.pdf

7. Create a chart to show the distribution of aid and funds to finance undergraduates' education in the academic year 2010–11, maintaining the units of measurement reported in table 7A.
    a. What type of chart fits this task? Explain why.
    b. Will your chart include data labels? If so, what type of information will they report?
    c. Write the following information for the chart.
        i. Title
        ii. Legend, if needed. If not needed, explain why.
        iii. Axis or other labels, if needed. If not needed, explain why.
8. Revise your chart from the previous question to portray the percentage distribution of values for 2010–11 instead of the original monetary units.
    a. Will your chart include data labels? If so, how are they different from those used in the chart you created for the preceding question?
    b. How, if at all, will the following elements of the chart change from the version you created for the preceding question?
        i. Title
        ii. Legend, if needed. If not needed, explain why.
        iii. Axis or other labels, if needed. If not needed, explain why.
9. Create a stacked bar chart to present the data on undergraduate education funding sources for each of the academic years 1990–91 through 2010–11. To help you plan your chart, answer the following questions, then draw an approximate stacked bar chart, allowing the level to vary by date.
    a. Which variable goes on the *x*-axis?
    b. Which variable goes in the slices (and legend)?
    c. Which variable goes on the *y*-axis, and in what units is it measured?

10. Revise your chart from the previous question to illustrate the relative importance (share) of different sources of funding in each year.
    a. What aspects of the chart remain the same as in the previous question? What aspects change?
    b. What are the advantages and disadvantages of the two versions of the chart in terms of portraying various aspects of trends in funding sources for undergraduate education over the period shown?