1. **Family size.** Suppose we want to estimate family size, where family is defined as one or more parents living with children. If we select students at random at an elementary school and ask them what their family size is, will our average be biased? If so, will it overestimate or underestimate the true value?

2. **Flawed reasoning.** Identify the flaw in reasoning in the following scenarios. Explain what the individuals conducting the studies could have done differently if they wanted to make such strong conclusions.

   (a) Students at an elementary school are given a questionnaire that they are required to return after their parents have completed it. One of the questions asked is, “Do you find that your work schedule makes it difficult for you to spend time with your kids after school?” Of the parents who replied, 85% said “no”. Based on these results, the school officials conclude that a great majority of the parents have no difficulty spending time with their kids after school.

   (b) A survey is conducted on a simple random sample of 1,000 women who recently gave birth, asking them about whether or not they smoked during pregnancy. A follow-up survey asking if the children have respiratory problems is conducted 3 years later, however, only 567 of these women are reached at the same address. The researcher reports that these 567 women are representative of all mothers.

   (c) A orthopedist administers a questionnaire to 30 of his patients who do not have any joint problems and finds that 20 of them regularly go running. He concludes that running decreases the risk of joint problems.
3. **What percentage voted?** In the 1998 General Society Survey, a random sample of 2613 eligible American voters were asked whether or not they had voted in the 1996 presidential election, and 1783 said yes they had. The Federal Election Commission reported that 49% of eligible American voters actually voted in the 1996 election.

(a) What is the population of interest? What is the sample of interest?

(b) What proportion of the people surveyed had said that they had voted?

(c) Is the proportion found in part (b) a parameter or a statistic? Why?

(d) Is the data from the Federal Election Commission a parameter or a statistic?

(e) What reasons could explain the differences between the survey data and the Federal Election Commission data?