3. Conditions. Consider each situation described below. Identify the population and the sample, explain what p and $\hat{p}$ represent, and tell whether the methods of this chapter can be used to create a confidence interval.
  a) Police set up an auto checkpoint at which drivers are stopped and their cars inspected for safety problems. They find that 14 of the 134 cars stopped have at least one safety violation. They want to estimate the percentage of all cars that may be unsafe.
  b) A TV talk show asks viewers to register their opinions on prayer in schools by logging on to a Web site. Of the 602 people who voted, 488 favored prayer in schools. We want to estimate the level of support among the general public.

13. Teenage drivers. An insurance company checks police records on 582 accidents selected at random and notes that teenagers were at the wheel in 91 of them.
  a) Create a 95% confidence interval for the percentage of all auto accidents that involve teenage drivers.
  b) Explain what your interval means.
  c) Explain what "95% confidence" means.
  d) A politician urging tighter restrictions on drivers' licenses issued to teens says, "In one of every five auto accidents, a teenager is behind the wheel." Does your confidence interval support or contradict this statement? Explain.

14. Junk mail. Direct mail advertisers send solicitations (a.k.a. "junk mail") to thousands of potential customers in the hope that some will buy the company's product. The response rate is usually quite low. Suppose a company wants to test the response to a new flyer, and sends it to 1000 people randomly selected from their mailing list of over 200,000 people. They get orders from 123 of the recipients.
  a) Create a 90% confidence interval for the percentage of people the company contacts who may buy something.
  b) Explain what this interval means.
  c) Explain what "90% confidence" means.
  d) The company must decide whether to now do a mass mailing. The mailing won't be cost-effective unless it produces at least a 5% return. What does your confidence interval suggest? Explain.

15. Safe food. Some food retailers propose subjecting food to a low level of radiation in order to improve safety, but sale of such "irradiated" food is opposed by many people. Suppose a grocer wants to find out what his customers think. He has cashiers distribute surveys at checkout and ask customers to fill them out and drop them in a box near the front door. He gets responses from 122 customers, of whom 78 oppose the radiation treatments. What can the grocer conclude about the opinions of all his customers?

18. Drinking. A national health organization warns that 30% of middle school students nationwide have been drunk. Concerned, a local health agency randomly and anonymously surveys 110 of the 1212 middle school students in its city. Only 21 of them report having been drunk.
  a) What proportion of the sample reported having been drunk?
  b) Does this mean that this city's youth are not drinking as much as the national data would indicate? Explain.
  c) Create a 95% confidence interval for the proportion of the city's middle school students who have been drunk.
  d) Is there any reason to believe that the national level of 30% is not true of the middle school students in this city?

31. Graduation. It's believed that as many as 25% of adults over 50 never graduated from high school. We wish to see if this percentage is the same among the 25 to 30 age group.
  a) How many of this younger age group must we survey in order to estimate the proportion of non-grads to within 6% with 90% confidence?
  b) Suppose we want to cut the margin of error to 4%. What's the necessary sample size?
  c) What sample size would produce a margin of error of 3%?

33. Graduation, again. As in Exercise 31, we hope to estimate the percentage of adults aged 25 to 30 who never graduated from high school. What sample size would allow us to increase our confidence level to 95% while reducing the margin of error to only 2%?