For problems 1-4, consider each situation described below. Identify the population and the sample, explain what $p$ and $\hat{p}$ represent.

1.  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.

2.  A TV talk show asks views to register their opinions on prayer in schools by logging onto a website. Of the 602 people who voted, 488 favored prayer in schools. We want to estimate the level of support among the general public.

3.  A school is considering requiring students to wear uniforms. The PTA surveys parent opinion by sending a questionnaire home with all 1245 students; 380 surveys returned with 228 families in favor of the change.

4.  A college admits 1632 freshman one year, and four years later 1388 of them graduate on time. The college wants to estimate the percentage of all their freshman enrollees who graduate on time.

5. A may 2000 Gallup Poll found that 38% of a random sample of 1012 adults said that they believe in ghosts.

   a. Find the margin of error for this poll if we want 90% confidence in our estimate of the percent of American adults who believe in ghosts.

   b. Explain what the margin of error means.

   c. If we want to be 99% confident, will the margin of error be larger or smaller? Explain.

   d. In general, if all other aspects of the situation remain the same, would smaller samples produce smaller or larger margins of error? Explain.

6. 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 confidence interval means.

   c. Explain what the confidence level 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.

7. A June 2004 Gallup Poll asked Americans who they though better fit their idea of what a first lady should be, Laura Bush or Hillary Clinton. More Americans believed Bush fit the bill, 52% to 43%. The remaining 5% felt that both women equally fit their idea of a first lady or neither of them did, or they had no opinion. The poll was based on a random sample of 1005 adults aged 18 and older.

   a. Find the 95% confidence interval for the true proportion of all U.S. adults who believe Laura Bush fits their idea of a first lady.

   b. If someone assumes that half of the U.S. adult population thinks Hillary Clinton fits the bill, what would you say?