Confidence interval: statistic $\pm$ (critical value) $\bullet$ (standard deviation of statistic)

Objectives

W.Up

RECAP: The Yale/George Mason poll that estimated that 40% of all voters believed that scientists disagree about whether global warming exists had a margin of error of $\pm 3\%$. Suppose an environmental group planning a follow-up survey of voters' opinions on global warming wants to determine a 95% confidence interval with a margin of error of no more than $\pm 2\%$.

QUESTION: How large a sample do they need? (You could take $p = 0.5$, but we have data that indicate $p = 0.40$, so we can use that.)

A credit card company is about to send out a mailing to test the market for a new credit card. From that sample, they want to estimate the true proportion of people who will sign up for the card nation-wide. A pilot study suggests that about 0.5% of the people receiving the offer will accept it.

QUESTION: To be within a tenth of a percentage point (0.001) of the true rate with 95% confidence, how big does the test mailing have to be?

Cars What fraction of cars is made in Japan? The computer output below summarizes the results of a random sample of 50 autos. Explain carefully what it tells you.

z-Interval for proportion
With 90.00% confidence,
$0.29938661 < p(\text{japan}) < 0.46984416$

The countries of Europe report that 46% of the labor force is female. The United Nations wonders if the percentage of females in the labor force is the same in the United States. Representatives from the United States Department of Labor plan to check a random sample of over 10,000 employment records on file to estimate a percentage of females in the United States labor force.

1. The representatives from the Department of Labor want to estimate a percentage of females in the United States labor force to within ±5%, with 90% confidence. How many employment records should they sample?

2. They actually select a random sample of 525 employment records, and find that 229 of the people are females. Create the confidence interval.

3. Interpret the confidence interval in this context.

4. Explain what 90% confidence means in this context.

5. Should the representatives from the Department of Labor conclude that the percentage of females in their labor force is lower than Europe's rate of 46%? Explain.