STAT 301 HW8 due Wed Oct 7

You may work with one partner on this assignment, submitting one report with both names, provided that both students contribute substantially to the work. Word-processed reports are preferred to hand-written ones. Please copy/paste relevant computer output into your report as appropriate.

Abolishing Pennies? (cont.)
In June of 2004, the Harris organization asked a random sample of 2136 adult Americans: "Would you favor or oppose abolishing the penny so that the nickel would be the lowest-denomination coin?" It turned out that 41% responded in favor of abolishing the penny.

a) Verify the conditions for using the Wald (z-) procedure to determine a 95% confidence interval for the population proportion who favor abolishing the penny.

$n\hat{p} = 2136(.41) \approx 876$ is much larger than 10, as is $n(1-\hat{p}) = 2136(.59) \approx 1260$

b) Calculate this 95% confidence interval.

This 95% confidence interval for the population proportion who favor abolishing the penny (π) is:

$\hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$, which is $.41 \pm 1.96\sqrt{\frac{(.41)(.59)}{2136}}$, which is .41 ± .021, which is (.389, .431).

c) Interpret what this interval reveals: We are 95% confident that …

We are 95% confident that between 38.9% and 43.1% of all adult Americans favored abolishing the penny in June of 2004.

d) Repeat b) for a 99% confidence interval.

This 99% confidence interval for π is:

$.41 \pm 2.576\sqrt{\frac{(.41)(.59)}{2136}}$, which is .41 ± .027, which is (.383, .437).

e) Describe how these two intervals compare, in terms of both their midpoints and widths.

The midpoints are the same (.41, the sample proportion), but the 99% CI is wider than the 95% CI.

f) Do these intervals suggest that fewer than half of all adult Americans favor abolishing the penny? Explain.

Yes, because the intervals contain only values that are below .5.

g) Suppose that the sample size had been half as large (1068 adult Americans), and the result had been the same (41% favor abolishing the penny). Determine a 95% confidence interval in this case, and comment on how it compares to the interval in (b).

This 95% confidence interval is:

$.41 \pm 1.96\sqrt{\frac{(.41)(.59)}{1068}}$, which is .41 ± .029, which is (.381, .439).

This interval is wider than the 95% confidence interval based on the larger sample, with the same midpoint (.41).