STA 291
Fall 2009

LECTURE 29

TUESDAY, December 8

Administrative Notes

- Special OH: Dec 11th Fri 1pm to 2pm, Dec 15th Tue 6pm to 7pm.

- The final will be at CB110 on Tue Dec 15th at 8:30pm to 10:30pm (make-up will be on Wed Dec 16th at 9:30am to 11:30am).
- Practice final is posted on the web as well as the old final.
- Suggested problems: 11.21 to 11.25

Review: Test for the Population Mean

	One-Sided Tests		Two-Sided Test
Null Hypothesis	$H_0 : \mu = \mu_0$		
Research Hypothesis	$H_1 : \mu < \mu_0$	$H_1 : \mu > \mu_0$	$H_1 : \mu \neq \mu_0$
Test Statistic	$z = \dfrac{\bar{X} - \mu_0}{s / \sqrt{n}}$		
p-value	$P(Z < z_{obs})$	$P(Z > z_{obs})$	$2 \cdot P(Z > \lvert z_{obs} \rvert)$

Large Sample Significance Test for a Population Proportion

	One-Sided Tests		Two-Sided Test
Null Hypothesis	$H_0 : p = p_0$		
Research Hypothesis	$H_1 : p < p_0$	$H_1 : p > p_0$	$H_1 : p \neq p_0$
Test Statistic	$z_{obs} = \dfrac{\hat{p} - p_0}{\sqrt{p_0(1-p_0)/n}}$		
p-value	$P(Z < z_{obs})$	$P(Z > z_{obs})$	$2 \cdot P(Z > \lvert z_{obs} \rvert)$

Significance Test for a Proportion

Assumptions

- What type of data?
  - *Qualitative*
- Which sampling method has been used?
  - *Random sampling*
- What is the sample size?
  - $n \geq 20$ *if is* p_0 *between 0.25 and 0.75*
  - *In general (rule of thumb): Choose* n *such that* $n \geq 5/p_0$ *and* $n \geq 5/(1 - p_0)$

Significance Test for a Proportion

Hypotheses

- Null hypothesis H_0: $p = p_0$ where p_0 is *a priori* (beforehand) specified

- Alternative hypotheses can be one-sided or two-sided

- Again, two-sided is more common

Significance Test for a Proportion

$$z_{obs} = \frac{\text{value from the data} - \text{value from } H_0}{\text{standard error of the estimator used}}$$

$$= \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}}$$

P-Value

- Calculation is exactly the same as for the test for a mean
- Find one- or two-sided tail probabilities using Table Z

Example

- Let $\boldsymbol{p}$ denote the proportion of Kentuckians who think that government environmental regulations are too strict

- Test H_0: $\boldsymbol{p} = 0.5$ against a two-sided alternative using data from a telephone poll of 834 people in which 26.6% said regulations were too strict

  1. Calculate the test statistic
  2. Find the *p*-value and interpret
  3. Using alpha=0.01, can you determine whether a majority or minority think that environmental regulations are too strict, or is it plausible that $\boldsymbol{p} = 0.5$?
  4. Construct a 99% confidence interval. Explain the advantage of the confidence interval over the test.

Attendance Survey Question #29

- ***On a 4”x6” index card***
  - Please write down your name and section number
  - Today’s Question: