Ch. 19 Testing Hypotheses about Proportions Reference Sheet

Hypothesis: model adopted temporarily

Starting Hypothesis: NULL HYPOTHESIS	ALTERNATIVE HYPOTHESIS
Notation: **H_0: parameter= hypothesized value** Example: **H_0: p = 0.20** (null hypothesis has a parameter of 20%)	Plausible if you reject the null hypothesis (H_0) Notation: **H_A: parameter= alternative value** (use <, >, or ≠) Example: **H_A: p < 0.20** (alternative hypothesis has a parameter less than 20%)

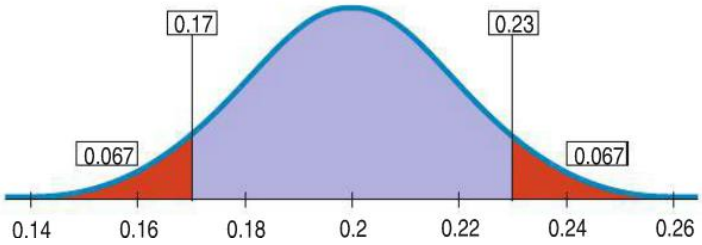
Process for Testing Hypotheses	Information
1) Hypotheses • State the null hypothesis • State the alternative hypothesis	Null Hypothesis (H_0) – skeptical claim that nothing is different about model parameters
2) Model • Check the assumptions & conditions • Specify model to use to test H_0 and the parameter of interest	Same conditions as Ch. 18 (Z-Interval…confidence intervals) • **Independent Assumption** • **Randomization Condition** • **10% Condition** • **Success/Failure Condition** Determine if using Normal Model, tests, displays, etc. $Z = \frac{p - p_0}{SD(p)}$ *and* $SD(p) = \sqrt{\frac{p_0 q_0}{n}}$ *P-Value found from Normal Model: PROBABILITY OF DATA IF NULL IS TRUE* *P-value: conditional probability if the null hypothesis is true*
3) Mechanics • Calculation of data • Complete any tests, usually hypothesis test and confidence interval • May need to find SD, z, etc.	After looking at the results to the data calculation tests, determine how surprising the data is if the null hypothesis is true. *Evaluate the P-value to either reject or fail to reject the null hypothesis.* **If the P-value is small, reject the null hypothesis. (means unlikely)** **If the P-value is not small, fail to reject the null hypothesis (not prove it true).** This means is is not unusual, so there is no reason to reject the null hypothesis. The P-value's size is determined by the context of the scenario.
4) Conclusion • Analyze tests to make a formal statement about the null hypothesis • Formal statement, evidence, and context needed	Use evidence to make a formal statement about the null hypothesis: reject or fail to reject). This conclusion is not the end of the testing procedure, but gives an action to take based on the results. **Effect Size**: size of the effect can be determined by examining the confidence interval. *Conclusion should always have P-value, null hypothesis, Z-test, and confidence interval, and context of the situation.*

One Proportion Z-Test: sample test for a proportion to assess the null hypothesis

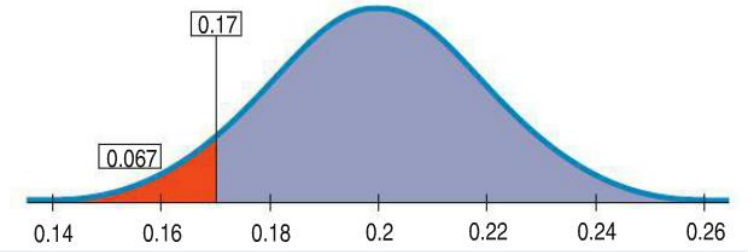
Hypothesis Test: burden of proof on the unusual claim (H_A need proof)

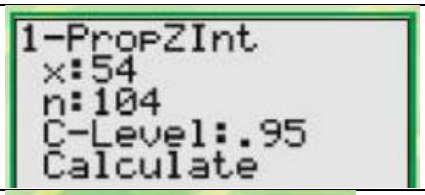
Types of Hypothesis Tests:

1) **Two-Sided Alternative**
   a. More conservative test (rejects the null hypothesis less often)
   b. Double the probability to find both tails of the normal model
   c. Used when ≠ (means can either be higher or lower than p)
   d. Example: H_A: p ≠ 0.20



2) **One-Sided Alternative**
   a. Less conservative test (rejects the null hypothesis more often)
   b. Only one direction for the P-value (half of the two-sided)
   c. Used when < or > (only higher OR lower)
   d. Example: H_A: p < 0.20



Calculator: 1-PropZint *STAT>TESTS>1-PropZint* x = # of successes n = sample size C-level = confidence level (%)	Calculates confidence intervals	
Calculator: 1-PropZTest *STAT>TESTS>1-PropZTest* p_0 = parameter of the null hypothesis x = # of successes n= sample size prop = which alternative hypothesis	Calculates the hypothesis test Draws the hypothesis test results via Normal Model