Chapter 8: Test of Statistical Hypotheses

8.3 Tests about Proportions

Let Y is the number of successes in n independent bernoulli trials.

Y/n

One sample Proportion Z-test

Assume n is large.

1. Write the Null and Alternative Hypothesis

2. Find the test statistic

3. Find the Critical region/ p-value

4. Make the decision

   (a) Technical:

   (b) English:

Example 1. It was claimed that many commercially manufactured dice are not fair because the "spots" are really indentations, so that, for example, the 6-side is lighter than the 1-side. Let p equal the probability of rolling a 6 with one of these dice. Several such dice will be rolled to yield a total of $n = 8000$ observations. Let Y equal the number of times that 6 resulted in the 8000 trials. The results of the experiment yielded $y = 1389$. Test the appropriate hypothesis.

Note 1. There are times when a two-sided alternative is appropriate; that is, here we test ____________________ against ____________________.

For example, suppose that the pass rate in the usual beginning statistics course is p_0. There has been an intervention (say, some new teaching method) and it is not known whether the pass rate will increase, decrease, or stay about the same. Thus, we test the null (no-change) hypothesis ____________________ against the two-sided alternative ____________________. A test with the approximate significance level α for doing this is to reject ____________________ if

Two sample proportion test

Table 1. Table of notations

1. Write the Null and Alternative Hypothesis

2. Find the test statistic

3. Find the p-value/ Critical region

4. Make the decision

   (a) Technical:

   (b) English:

Remark 1. In testing both $H_0 : p = p_0$ and $H_0 : p_1 = p_2$, statisticians sometimes use different denominators for z.

– For tests of **single proportions**, ____________________ can be replaced by ____________________

– For tests of the equality of **two proportions**, the following denominator can be used:

Note 2. **Testing Hypothesis using CI single for proportion**

1. If the null hypothesis is $H_0 : p = p_0$, then the alternative hypothesis $H_1 : p < p_0$ is accepted if,

2. If the null hypothesis is $H_0 : p = p_0$, then the alternative hypothesis $H_1 : p > p_0$ is accepted if,

3. If the null hypothesis is $H_0 : p = p_0$, then the alternative hypothesis $H_1 : p \neq p_0$ is accepted if,