

## Lecture 41 Summary (Chapter 10)

**Example 8** A study is undertaken to compare the rates of prevalence of CF antibody to a certain virus among boys and girls in the age group of 5 to 9 years. Among 191 girls tested, 101 are found to have the antibody, and among 64 boys tested, 56 have the antibody. Do the data provide strong evidence that the rate of prevalence of the antibody is significantly different between girls and boys? Use  $\alpha = .01$ .

$$n_1 = 191, x = 101, \hat{p}_1 = .529; n_2 = 64, y = 56, \hat{p}_2 = .875$$

Step 1  $H_0: p_1 - p_2 = 0$  versus  $H_1: p_1 - p_2 \neq 0$

Step 2  $\alpha = .01$

Step 3 Sample proportion:

$$\hat{p} = \frac{x + y}{n_1 + n_2} = \frac{101 + 56}{191 + 64} = .616$$

Test statistic:

$$Z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}(1 - \hat{p}) [(1/n_1) + (1/n_2)]}}$$

Rejection region:  $|Z| \geq z_{\alpha/2} = z_{.005} = 2.58$

Step 4

$$z = \frac{.529 - .875}{\sqrt{(.616)(.384) [(1/191) + (1/64)]}} = -4.94$$

$|z| = 4.94 > 2.58 \implies$  Reject  $H_0$ .

Step 5  $p\text{-value} = P(|Z| > 4.94) = 2P(Z < -4.94) \simeq 0$

**Computing:** See Minitab Tutorial, Two sample  $t$ -test and Paired  $t$ -test.