Stat 160 Fall 2008
Comparing Two Proportions

The formula given on November 18, 2008, for comparing two population proportions using the plus four method was incorrect. The correct formula is given below. (See the box on page 518 of the text as well.)

Consider the population proportions for two (sub)populations. If we are interested in estimating the difference $p_1 - p_2$ between the two population proportions, then we collect simple random samples of sizes n_1 and n_2 from each population and count the number of successes X_1 and X_2 in each SRS. It then follows that a level C confidence interval (using the plus four method) is given by

$$(\tilde{p}_1 - \tilde{p}_2) \pm z^* \sqrt{\frac{\tilde{p}_1(1-\tilde{p}_1)}{n_1+2} + \frac{\tilde{p}_2(1-\tilde{p}_2)}{n_2+2}}$$

where

$$\tilde{p}_1 = \frac{X_1+1}{n_1+2} \quad \text{and} \quad \tilde{p}_2 = \frac{X_2+1}{n_2+2}.$$

If, instead, we are interested in performing a significance test of

$$H_0 : p_1 = p_2,$$

then we compute the z test statistic given by

$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}(1-\hat{p})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

where

$$\hat{p}_1 = \frac{X_1}{n_1}, \quad \hat{p}_2 = \frac{X_2}{n_2}, \quad \text{and} \quad \hat{p} = \frac{X_1+X_2}{n_1+n_2},$$

and use Table A as appropriate to calculate a P-value.