Solutions for quiz 10

1. (a) Null Hypothesis $H_0 : p_1 - p_2 = 0$
   Alternative Hypothesis: $H_a : p_1 - p_2 \neq 0$
   where
   p_1= the proportion of pledgers that had been laid off
   p_2= the proportion of non-pledgers that had been laid off

   (b) Test statistic

$$Z = \frac{\hat{p_1} - \hat{p_2}}{\sqrt{\frac{\hat{p}(1-\hat{p})}{n_1} + \frac{\hat{p}(1-\hat{p})}{n_2}}}$$

   where

$$\hat{p} = \frac{n_1\hat{p_1} + n_2\hat{p_2}}{n_1 + n_2}$$

   (c) $Z \sim N(0, 1)$

   (d)

$$\hat{p_1} = 78/175 = .446 \hat{p_2} = 208/604 = .344$$

$$\hat{p} = \frac{n_1\hat{p_1} + n_2\hat{p_2}}{n_1 + n_2} = \frac{78 + 208}{175 + 604} = .367$$

$$SE_{(\hat{p_1} - \hat{p_2})} = \sqrt{\frac{\hat{p}(1-\hat{p})}{n_1} + \frac{\hat{p}(1-\hat{p})}{n_2}} = \sqrt{\frac{(.367)(.633)}{175} + \frac{(.367)(.633)}{604}} = .0414$$

$$Z = \frac{.446 - .344}{.0414} = 2.46$$

   (e) Significance level $\alpha = 4\%$, $Z_{.02} = 2.05$
   Rejection region: $\{|Z| > 2.05\}$

   (f) Attained significance level (p-value)= $2P(Z > 2.46) = 2(.0069) = .0138$

   (g) We reject the null hypothesis because the test statistic falls in the rejection region and p-value $< \alpha$.