Homework Assignments
Applied Logistic Regression

Week 2

Exercise 1:

Use the Myopia Study (MYOPIA.dta)

Using the results of the output from Stata, assess the significance of the slope coefficient for SPHEQ using the likelihood ratio test and the Wald test. What assumptions are needed for the *p*-values computed for each of these tests to be valid? Are the results of these tests consistent with one another? What is the value of the deviance for the fitted model?

Likelihood Ratio Test

$H_0: \beta_1 = 0$

$H_1: \beta_1 \neq 0$

$$G = -2\ln\left(\frac{\text{likelihood without SPHEQ}}{\text{likelihood with SPHEQ}}\right) \sim \chi^2(1)$$

$G = 142.73$

$p < 0.05$

Hence we reject the null hypothesis at level 0.05, and conclude that it is worthy of including SPHEQ in the model.

142.73> 3.84 (the critical value for a chi square distribution with one degree of freedom). Therefore, we reject the null.

Wald test

$H_0: \beta_1 = 0$

$H_1: \beta_1 \neq 0$

$$W = \frac{\hat{\beta}_1}{\widehat{SE}(\beta_1)} \sim N(0,1)$$

$W = -9.16$

$p < 0.05$

Hence we reject the null hypothesis at level 0.05, and conclude that it is worthy of including SPHEQ in the model.

Notice the Wald and Likelihood ratio test reach the same conclusions. We reject the null hypothesis for both and conclude that SPHEQ should remain in the model.