Name Jerry

Student Number _____

STA 442/2101 f2014 Quiz 8

1. (5 points) Starting with an expression on the formula sheet, derive a $(1-\alpha)\times 100\%$ confidence interval for a linear combination of regression coefficients. Show your work.

$$T = \frac{a^T\hat{\beta} - a^T\beta}{\sqrt{MSE\, a^T(X^TX)^{-1}a}} \sim t(n-p)$$

$$1-\alpha = P\{-t_{\alpha/2} < T < t_{\alpha/2}\} = P\left\{-t_{\alpha/2} < \frac{a^T\hat{\beta} - a^T\beta}{\sqrt{MSE\, a^T(X^TX)^{-1}a}} < t_{\alpha/2}\right\}$$

$$= P\{-a^T\hat{\beta} - t_{\alpha/2}\sqrt{MSE\, a^T(X^TX)^{-1}a} < -a^T\beta < -a^T\hat{\beta} + t_{\alpha/2}\sqrt{MSE\, a^T(X^TX)^{-1}a}\}$$

$$= P\{a^T\hat{\beta} + t_{\alpha/2}\sqrt{MSE\, a^T(X^TX)^{-1}a} > a^T\beta > a^T\hat{\beta} - t_{\alpha/2}\sqrt{MSE\, a^T(X^TX)^{-1}a}\}$$

$$= P\{a^T\hat{\beta} - t_{\alpha/2}\sqrt{MSE\, a^T(X^TX)^{-1}a} < a^T\beta < a^T\hat{\beta} + t_{\alpha/2}\sqrt{MSE\, a^T(X^TX)^{-1}a}\}$$

It's okay to skip SOME steps

2. (5 points) In your homework, you calculated a 95% confidence interval for the difference between the expected weight of chicks fed horsebean, and the average of the other five expected weights. Write the confidence interval in the space below in the form of two numbers, a lower confidence limit and an upper confidence limit. Circle the numbers on your printout, and write "Question 2" beside them.

$(-156.106, -81.329)$

↑ Lower ↑ Upper