**Stat763 HW06**

1. Consider model $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \epsilon$ with $y$, $x_1$, $x_2$, $x_3$, $x_4$, $x_5$, $x_6$ stored in Table94.txt.

   (1) Find SSE, DF and MSE

   SSE = 6.37871, DF = 5 and MSE = 1.27574

   (2) Find a 90% confidence interval for $\beta_4$

   $\widehat{\beta}_4 \pm t_{0.05}(5) S_{\widehat{\beta}_4} = -0.84396 \pm 2.015 \times 1.40313 = (-3.67133, 1.98341)$
   is a 90% confidence interval for $\beta_4$.

   (3) With $x_{01} = 1$, $x_{02} = 5$, $x_{03} = 5$, $x_{04} = 5$, $x_{05} = 0$ and $x_{06} = -0.5$, find a 90% prediction interval for $y(x_0)$.

   $$\begin{aligned} \widehat{y}(x_0) \pm t_{0.05}(5) S_{\widehat{y}(x_0) - y(x_0)} &= 1.3164 \pm 2.015\sqrt{1.27574 + 8.4287^2} \\ &= 1.3164 \pm 17.1356 = (-15.8196, 18.452) \end{aligned}$$
   is a 90% prediction interval for $y(x_0)$.

2. Consider the model in 1 and $H_0 : \beta_i = 0$ for all $i = 1, 3$ versus $H_a : \beta_i \neq 0$ for some $i = 1, 3$.

   (1) Find $SSE_r$ from the model reduced by $H_0$

   $SSE_r = 9.11309$

   (2) Complete ANOVA table for $H_0$

| Source | SS | DF | MS | F | p |
|---|---|---|---|---|---|
| Hypothesis (N) | 2.73438 | 2 | 1.36719 | 1.072 | 0.410 |
| Error (D) | 6.37871 | 5 | 1.27574 | | |
| Error (R) | 9.11309 | 7 | | | |

   (3) In the reduced model find a 90% confidence interval for $\sigma^2$

   $\left(\frac{SSE}{\chi^2_{0.05}(7)}, \frac{SSE}{\chi^2_{0.95}(7)}\right) = \left(\frac{9.11309}{14.06738} \frac{9.11309}{2.16748}\right) = (0.6478, 4.2045)$
   is a 90% confidence interval for $\sigma^2$.