Key for First Fall Exam 2003

Problem A:

1. A: Essay_i = \[ \beta + \epsilon \] \[ H_0: \beta = 6.5 \]
   C: Essay_i = \[ 6.5 + \epsilon \] \[ pa=1, pc=0 \]

2. A: Essay_i = \[ \beta + \beta_i MBE_i + \epsilon \] \[ H_0: \beta_i = 0 \]
   C: Essay_i = \[ \beta + \epsilon \] \[ pa=2, pc=1 \]

3. MBE_{dev} = MBE - mean of MBE
   A: Essay_i = \[ \beta + \beta_i MBE_{dev} + \epsilon \] \[ H_0: \beta_i = 6.5 \]
   C: Essay_i = \[ \beta + \epsilon \] \[ pa=2, pc=1 \]

4. A: Essay_i = \[ \beta + \beta_i MBE + \epsilon \] \[ H_0: \beta_i = .04 \]
   C: Essay_i = \[ \beta + .04 MBE + \epsilon \] \[ pa=2, pc=1 \]

5. Sexcode = +1 if male, -1 if female
   A: Essay_i = \[ \beta + \beta_i Sexcode + \epsilon \] \[ H_0: \beta_i = 0 \]
   C: Essay_i = \[ \beta + \epsilon \] \[ pa=2, pc=1 \]

6. Sexdummy = +1 if male, 0 if female
   A: Essay_i = \[ \beta + \beta_i Sexdummy + \epsilon \] \[ H_0: \beta_i = 6.5 \]
   C: Essay_i = \[ \beta + \epsilon \] \[ pa=3, pc=1 \]

7. A: Essay_i = \[ \beta + \beta_i MBE_i + \epsilon \] if male
   Essay_i = \[ \beta + \beta_i MBE_i + \epsilon \] if female
   C: Essay_i = \[ \beta + \beta_i MBE_i + \epsilon \]

8. Nonindependence – students within a law school are likely to be more similar than students between law schools.

Problem B:

1. A: Between_i = \[ \beta + \epsilon \] \[ pa-pc=1 \]
   C: Between_i = \[ 70 + \epsilon \] \[ n-pa=220 \]
   \[ SSR = 222(71.009-70)^2 = 226.014 \]
   \[ SSE(A) = 36203.982 \]
   \[ PRE = .006; F* (1,220) = 1.380; \] \[ crit F (1,221) = 3.89 \] [Note: there was no crit F for n-pa = 221 so I was conservative and used n-pa=200]
   There is no evidence that time between eruptions was different from 70 minutes on average.

2. \[ b0 = 33.97 \] \[ \Rightarrow \] If the duration of eruption was 0 minutes then we predict it will be 33.97 minutes until the next eruption.
   \[ b1 = 10.36 \] \[ \Rightarrow \] As the duration of eruption increases by 1 minute (1 unit on the duration variable), we predict the time between eruptions will increase by 10.36 minutes.

3. A: Between_i = \[ \beta + \beta_i Duration_i + \epsilon \] \[ pa-pc=1 \]
   C: Between_i = \[ \beta + \epsilon \] \[ n-pa=220 \]
   \[ PRE = .770; F* (1,220) = 734.56; p = .0001 \]
   Duration of eruption is a good predictor of time between eruptions. As eruption duration increases, so does time between eruptions.
4. \( r = \sqrt{R^2} = \sqrt{.770} = .877 \)

5. **A:** Between \( i = b_0 + b_1 \text{Duration} \) i.e., \( \text{pa-pc} = 1 \)
   
   **C:** Between \( i = 70 + b_1 \text{Duration} \) i.e., \( n-pa = 220 \)
   
   \( \text{SSE(A)} = 8344.056; \text{SSR} = 226.014; \text{SSE(C)} = 8570.07 \)
   
   \( \text{PRE} = .026; F^{*}(1,220)=5.96; p < .05 \)
   
   Controlling for duration of eruptions, the mean time between duration was significantly longer than 70 minutes.

**Problem C:**

1. \( b_0 = 18.20 \) \( \rightarrow \) the mean of the mean number of problems completed by subjects of experimenters expecting good performance and the mean number of problems completed by subjects of experimenters expecting poor performance is 18.20 problems.
   
   \( b_1 = .58 \) \( \rightarrow \) the difference between the mean number of problems completed in the good expectations and poor expectations conditions is .58 problems.

2. **A:** Perf \( i = b_0 + b_1 X_i \) i.e., \( \text{pa-pc} = 1 \)

   **C:** Perf \( i = b_0 + e_i \) i.e., \( n-pa = 15 \)

   \( \text{SSE(A)} = 245.43; \text{SSE(C)} = 251.43 \)

   \( \text{PRE} = .0224; F^{*}(1,15) = .344; p=.57 \)

   There is no evidence to suggest that the experimenter’s expectations had any effect on participants’ performance.

3. **CI**: .576 + or – \( \sqrt{[(4.54* 16.362)/(16*.26)]} = .576 + or – 4.23 \)
   
   We are 95% certain that the true difference between the two conditions’ performance on these math problems is between –3.654 (that participants of experimenters with poor expectations perform 3.654 more problems than participants of experimenters with good expectations) and 4.806 (that participants of experimenters with good expectations perform 4.806 more problems than participants of experimenters with poor expectations).

4. The PRE is less than we would expect from a junk parameter.