STAT 217: Two-Way Anova, Interaction Models 2-13

Suppose a statistics teacher gave an essay final to his class. He randomly divides the classes in half such that half the class writes the final with a blue-book and half with notebook computers. In addition the students are partitioned into three groups, no typing ability, some typing ability, and highly skilled at typing. Answers written in blue-books will be transcribed to word processors and scoring will be done blindly. Not with a blindfold, but the instructor will not know the method or skill level of the student when scoring the final. The dependent measure will be the score on the essay part of the final exam.

Use the following R output to answer these questions.

```
## Analysis of Variance Table
##
## Response: y
##                Df Sum Sq Mean Sq F value  Pr(>F)
## ability         2  300.1   150.1   15.43 0.00048
## method          1   34.7    34.7    3.57 0.08318
## ability:method  2   18.8     9.4    0.97 0.40843
## Residuals      12  116.7     9.7
```

```
summary(lm.int)

##
## Call:
## lm(formula = y ~ ability * method)
##
## Residuals:
##    Min     1Q Median     3Q    Max
## -3.667 -1.917 -0.667  1.167  5.333
##
## Coefficients:
##                              Estimate Std. Error t value Pr(>|t|)
## (Intercept)                  2.33e+01   1.80e+00   12.96    2e-08
## abilitynone                  3.33e+00   2.55e+00    1.31    0.215
## abilitysome                  7.67e+00   2.55e+00    3.01    0.011
## methodcomputer               1.33e+00   2.55e+00    0.52    0.610
## abilitynone:methodcomputer -4.44e-16   3.60e+00    0.00    1.000
## abilitysome:methodcomputer  4.33e+00   3.60e+00    1.20    0.252
##
## Residual standard error: 3.12 on 12 degrees of freedom
## Multiple R-squared:  0.752,Adjusted R-squared:  0.649
## F-statistic: 7.27 on 5 and 12 DF,  p-value: 0.00239
```

The response is the length of odontoblasts (teeth) in each of 10 guinea pigs at each of three dose levels of Vitamin C (0.5, 1, and 2 mg) with each of two delivery methods (orange juice or ascorbic acid).

```
                          Df   Sum Sq   Mean Sq F value    Pr(>F)
factor(supp)              ___  ___      205.35  15.572  0.0002312 ***
factor(dose)              ___  2426.43   ____   _____   < 2.2e-16 ***
factor(supp):factor(dose) ___  108.32    _____  _____   0.0218603 *
Residuals                 ___  ____     13.19
-------------------------------------------------------------
```