Biology 4605/7220/ST4581 Name _____Key_____
Final Examination 11 December 1992

1. (Nominal scale variables in boldface).

nested ANOVA $\underline{Y} = \beta_o + \beta_1\mathbf{X1} + \beta_2\mathbf{X2}(\mathbf{X1}) + \epsilon$

t-test $\underline{Y} = \beta_o + \beta_1\mathbf{X1} + \epsilon$

Regression $\underline{Y} = \beta_o + \beta_1\underline{X1} + \epsilon$

Analysis of Covariance $\underline{Y} = \beta_o + \beta_1\mathbf{X1} + \beta_2\underline{X2} + \beta_{1*2}\,\mathbf{X1}\,\underline{X2} + \epsilon$

2. C5 shows residuals
residuals invariant ? no
No, because residuals show pattern of zero values at low t, high values at intermediate t, and low values at high t.

3. ST is correct. It has dimensions of $M^0\ L^0\ T^0$
ST* is not correct, it has dimensions of $M^{-1}\ L^3\ T^0$

4. For a thesis, all three are appropriate.
For newspaper, use verbal models, diagrams only sparingly.

5. histogram, nscores, fit to normal distribution (rootogram).
1. Use randomization to obtain better estimate of p-value. 2. Use transformation.
New model sometimes uninterpretable (e.g. arcsin transformation).

6. L = 11 R after L = 5 E(R after L) = (11)(0.5) = 5.5
Bootstrap by
-sampling the 21 observations with replacement
-computing observed statistic, R.L = number of R after L
-repeat at least 500 times to get good estimate of distribution R.L
-identify the 5% extreme values in the distribution (2.5% in each tail).
-report these values.

7. D = 11 grams

(nominal scale variables in bold)

Analysis A . . . . . $\underline{W} = \beta_0 + \beta_{ST}\mathbf{ST} + \epsilon$
Analysis B . . . . . $\underline{W} = \beta_0 + \beta_{ST}\mathbf{ST} + \beta_{YR}\mathbf{YR} + \epsilon$
Analysis C . . . . . $\underline{W} = \beta_0 + \beta_{ST}\mathbf{ST} + \beta_{YR}\mathrm{YR} + \epsilon$

Analysis B is better than A because Type II error will be lower. Removing the year effect reduces the MSerror, increasing the power of the test to detect a difference.

Analysis C is no improvement over B because there is no further reduction in MSerror