Biology 4605/7220 Name_____
8 November 2007 Exam #2a

For each of the following situations (1 and 2):

nv = number of variables
nt = number of terms
A. score = 3nv
B. score = nt
C. score = 2nv + 2
D. score = 1

(A) Define variables in a tabular format, as follows.

name	symbol	scale

scale = nominal, ordinal, or cardinal
cardinal = interval or ratio scale.

(B) Using the symbols, write a general linear model relating the response variable to explanatory variable(s) and interaction terms (if appropriate).

(C) Complete the first two columns of the ANOVA table

source	df

(D) State the name of the analysis, from the following list.
t-test, one-way ANOVA, two-way ANOVA, three-way ANOVA
paired comparisons, randomized blocks,
hierarchical (nested) ANOVA
regression, multiple regression,
ANCOVA (at least 1 nominal and at least 1 cardinal scale explanatory variable)
none of the above.

1. Huntsberger (1967, *Elements of Statistical Inference*, p309) reported the results of an experiment to compare yields (in bushels per acre) or three varieties of barley. The experiment was conducted by planting all three varieties in each of 6 blocks.

A=9 B=4 C=8 D=1

A. name symbol scale

C. source df

B. _____ = _____ + ϵ

D.

2. Huntsberger (1967, p281) reported the results of a survey to see if boulder size was related to distance downstream. Samples were taken every half mile, beginning at mile 1 and continuing to mile 6.5.

A=9 B=4 C=8 D=1

A. name symbol scale

C. source df

B. _____ = _____ + ϵ

D.

3. (From Huntsberger, 1967, Problem 8, p 173) Given *n* random samples of the variable *Y*, which is distributed normally, the quantity *t* will follow a t-distribution with $n - 1$ degrees of freedom. The quantity F will follow the F-distribution, where $F = t^2$

$$t = \frac{\sqrt{n}\left(\overline{Y} - \mu\right)}{s}$$

Find *t*, given n =37, s = 3, $\overline{Y} - \mu = 6$ _____[2]

Find s^2, given n =37, $\overline{Y} - \mu = 6$, t = 2.339 _____[2]

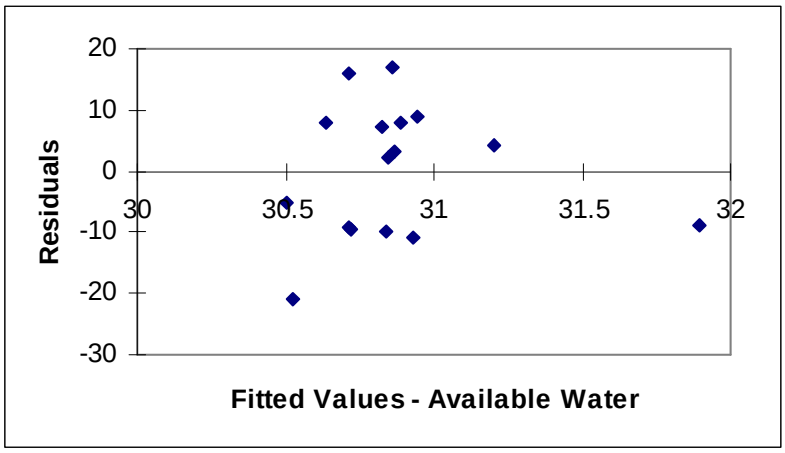
Find *F*, given n =50, s = 3, $\overline{Y} - \mu = 6$ _____[2]

4. Huntsberger (1967 p224) reported the yields in bushels per acre for 2 oat varieties. Each was tried on 8 plots. Complete the ANOVA table. [7]

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*
Varieties	_____	___	52.201	0.3389	0.5697
Within varieties (error)	_____	___	_____		
Total	2208.9	___			

5. Huntsberger (1967 p281) reported on heights of trees in relation to water availability. Here are the fitted and residual values for the regression of tree height on available water.

Predicted	*Residuals*
30.84715	2.152852
30.8681	3.231905
30.83667	-9.836674
30.52246	-21.02246
31.20325	4.196747
30.50152	-5.201517
30.71099	-9.31099
30.85762	16.84238
30.93094	-10.93094
31.89452	-8.794515
30.8262	7.273799
30.71099	15.88901
30.72146	-9.621464
30.88904	8.010957
30.63767	8.062325
30.94141	9.058589



List and evaluate 5 assumptions for the regression, stating the evidence you used. [15]

6. To compare the average gains of pigs fed 2 different rations, 9 pairs of pigs were used. The pigs within each pair were littermates, and the rations were assigned at random to the 2 animals within each pair, and they were individually housed and fed. The gains, in pounds, after 30 days are given below. (Huntsberger, 1967, p226).

Ration	Litter									Sum
	1	2	3	4	5	6	7	8	9	
A	60	38	39	49	49	62	53	42	58	450
B	53	39	29	41	47	50	56	47	52	414

Define response and explanatory variables, with symbols. [3]

In the space below, arrange the data in model format, with column headings for explanatory and response variables. [6]