| Biology | 4605/7220 |
|---------|-----------|
| 6 Nover | mber 2002 |

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

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

<u>name</u> <u>symbol</u> <u>scale</u>

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

nv = number of variables

nt = number of terms

A. score = 3nv

B. score = nt

C. score = 2nv + 2

D. score = 1

- (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 <u>source</u> <u>df</u>
- (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. Daniel (*Biostatistics* 1995, p234) reported cell diameters (µm) of 40 lymphocytes and 50 tumor cells obtained from biopsies of tissue from patients with melanoma. Do cancerous and non-cancerous cells differ in diameter?

 A=6 B=3 C=6 D=1

| A. | name | symbol | scale | |
|----|------|--------|-------|--|
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| | | | | |

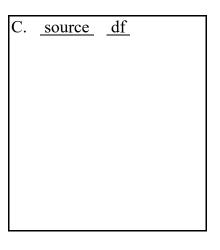
| C. | source | df | |
|----|--------|----|--|
| | | | |
| | | | |
| | | | |
| | | | |

Β. _____ + ε [3]

D. [1]

2. Does birth weight depend on maternal smoking, controlled for gestation period and maternal weight? Selvin (*Practical Biostatistical Methods*, 1995, Duxbury Press) reported birth weights of first infants (grams), gestation period (weeks), maternal smoking (0, 10-20, or \geq 40 cigarettes per day), and maternal weight (kg) for 48 women over 40 years old. (Assume no interactive effects of explanatory variables on the response variable, as in multiple regression).

| A. <u>name</u> | symbol | scale |
|----------------|--------|-------|
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B.
$$\underline{\hspace{1cm}} = \underline{\hspace{1cm}} + \varepsilon \hspace{1cm} [3]$$

| of this variabilit | y is due to treatme | a table for which the total Sum of Squares is 100, 15% ent effects (control vs one treatment), and the sample IS and F-ratio |
|--------------------|---------------------|--|
| _ | • | oute a p-value for the F-ratio in the table you have normal and independent, with fixed variance[2] |
| | , | rease) of <u>halving</u> the sample size, in the ANOVA table table with the same model structure)[3] |
| | decrease | in MS error |
| increase | decrease | in F-ratio |
| increase | decrease | in p-value |

| Rohl | lf, 1995, | p 208), tl | nen def | ine a symb | ol for the ob | served (samp | on rabbit #4 ole) mean and | the true |
|-----------|------------------|---|-------------|----------------|------------------|------------------|-------------------------------|------------------|
| | | ata on sc | | vidth (6 val | ues below) | write | =_ (Symbol) : | [1] = (Value) |
| | _ | | - | | | dence limits | , • | , , , |
| | B > inv 0.010 | 7cdf c1 00 -3 50 -2 00 -2 00 -1 00 1 00 2 | 0; .3649 | SUBC> t | · | for the 95% | limits ? | [1] |
| 4e. (| Compute | the 95% | confid | lence limits | | | | [2] |
| C6 MTI | 376 B > des | 344 scribe | 342 c6 | 372 | 374 | 360 | | |
| C6 | | cWidth | N | MEAN 361.33 | MEDIAN 366.00 | TRMEAN 361.33 | STDEV 15.27 | SEMEAN 6.23 |