Using the following format, complete exercises 18.7 18.13 18.18 18.28 18.34 in Sokal and Rohlf 1995.

(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, repeated measures
hierarchical (nested) ANOVA
regression, multiple regression,
1-way ANCOVA (= 1 nominal and 1 cardinal scale explanatory variable)
2-way ANCOVA (= 2 nominal and 1 cardinal scale explanatory variable)
none of the above.

Exercise 18.7 Sokal and Rohlf 1995. . . . . .

A. ioP = inorganic phosphorus $df_{tot} = 10*14-1 = 139$
t = time (days) $df_t = 14-1 = 13$
S = subjects (10) $df_S = 10 - 1 = 9$
$df_{err} = 139 - 13 - 9 = 117$

D. Randomized blocks. To test for interaction (two-way ANOVA) take at least 2 measurements each morning, rather than one.

Exercise 18.13 . . . . . .

A. V_{O2} = volume of O_2 consumed. $df_{tot} = 6*7-1 = 41$
Tr = treatment (5 drugs + 1 control) $df_{tr} = 5$
R = replicate (7 animals) $df_{err} = 6(7-1) = 36$

D. One-way ANOVA. Check for constancy of error variance by plotting residuals versus fits.

If not constant, and p-values are far from criterion ($\alpha = 5\%$) then
undertake randomization to obtain more accurate p-value.

Exercise 18.18 . . . . . .

A. M = body weight (kg) $df_{tot} = 1243 - 1 = 1242$
bp = bile pigment (%)

D. Correlation, because explanatory variable X is not known.

Exercise 18.28 . . . . . .

A. $Psize_{lag=0}$ = prey size (0 = big, 1 = small) $df_{tot} = 30 - 1 = 29$
$Psize_{lag=1}$ = prey size matched to $Psize_{lag=0}$ by lag = 1 $df_{lag=1} = 29 - 1 = 28$
$Psize_{lag=2}$ = prey size matched to $Psize_{lag=0}$ by lag = 2 $df_{lag=2} = 29 - 2 = 27$
$Psize_{lag=3}$ = prey size matched to $Psize_{lag=0}$ by lag = 3 $df_{lag=3} = 29 - 3 = 26$

D. Autocorrelation at lag 1, 2, 3, possibly more. Explanatory variable X unknown.
Alternative: see question 6 on exam above----> randomization test.
Alternative: as in question 6 above---> test fit to binomial outcome,
with 50% success

Exercise 18.34 . . . . . .

A. N = plant abundance $df_{tot} = n - 1$
pV1 = physical variable 1 (e.g. light in lux)
pV2 = physical variable 2 (e.g. nutrients)
bV1 = biological variable 1 (e.g. distance to nearest tree)
bV2 = biological variable 2 (e.g. presence/absence of micorhizae in soil)

D. Multiple regression, stepwise dropping of variables. $df_{err} = df_{tot} - k$
where k = number of variables in the model.