STAT 514
Exam I — Spring 1994

Name _____

1) Four antihypertension drugs are being investigated in an experiment. There are eight subjects in each of four groups. Each of the four groups gets one of the four drugs.

   a) What is the ANOVA table with d.f.?

   b) Find a set of contrasts which make the same means comparisons as SNK. Are they orthogonal? (Show why.)

   c) If I test at the .05 level, what is the approximate experiment wise error rate at the contrasts of b)?

   d) Which of the two (SNK_1 contrasts) is more likely to make a type II error? Why?

An engineer is interested in the effect of temperature and processing time on the hardness of screws. Three randomly selected batches of screws are selected for the experiment. The engineer decides to investigate temperatures of 25°, 30°, 35° centigrade and processing times of 5 minutes and 10 minutes. Assuming that there are 5 screws for each batch-temp-time combination:

a) Write out the model.

b) Write out the ANOVA table with d.f.

c) Work out the EMS with the algorithm on the back of this sheet.

d) For which terms and under what conditions would you do means comparisons?

Regarding the Tukey test for non-additivity.

a) If I am sure that my experimental error is normally distributed but my normality test rejects ($p < .001$), what would you conclude?

b) After using the Tukey test, would I be able to use Bartlett's test to check equality of variances? If not, what could you do?

In a heat treatment experiment we have the following layout.

$°C$

20	30	40	50
$x\ \ x$ $\ \ x$ $x\ \ x$	$x\ \ x$ $\ \ x$ $x\ \ x$	$x\ \ x$ $\ \ x$ $x\ \ x$	$x\ \ x$ $\ \ x$ $x\ \ x$

The experimenter believes that temperature causes a jump in the response at 35°C, but that otherwise has no effect. Find a set of orthogonal contrasts to test this.

In an experiment on viscosity, four randomly chosen operators and four specific instruments were chosen. Two observations on each operator-instrument combination were made, yielding the ANOVA table below.

Source	df	MS
O_i	3	1498
I_j	3	1816
OI_{ij}	9	218
error	16	67

Joe Blow analyzed the data as both factors fixed and went on to test cell means. What is Joe's mistake and what should he have done?