Biostats VHM 802 Course
Winter 2014, Atlantic Veterinary College, PEI
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Additional exercises for Session 6: One-way ANOVA techniques

Exercise 6.1

Inference for contrasts

An experiment divided 50 white rats randomly into five groups of 10 each, whereupon each group was given a different diet (from Conover (1971), *Practical Nonparametrical Statistics*, p. 326). The outcome of interest was the amount (concentration) of iron found in the livers of the rats. For the purpose of this exercise, we assume the following interpretation of the 5 diets:

Diet	A	B	C	D	E
Main nutritional component	beef	pork	poultry	dried beans	oats

Analyze the data, with particular focus on the following points:

1) Carry out a standard oneway ANOVA analysis, including model validation. If the model assumptions are not met to a satisfactory degree, try to improve the situation by a suitable transformation of the outcome. Do the data show any evidence of differences between the diets?

2) Consider the 4 contrasts given by their coefficients in the table.

	Diet				
Contrast	A	B	C	D	E
Beef vs pork	1	-1	0	0	0
Mammals vs poultry	1	1	-2	0	0
Animal vs vegetable	2	2	2	-3	-3
Beans vs oats	0	0	0	1	-1

   Convince yourself that the contrast coefficients match the interpretations given. Show also that these contrasts are orthogonal.

3) Compute the estimate, SE, t-test and sum of squares for all the contrasts. Interpret the results, and draw conclusions.

4) Supplement the analysis from 3) by computing the Scheffé test for each contrast. Does this change your conclusions?