Psychology 407
Assignment H

Suppose we wish to compare two methods of teaching (traditional [T] and modern [M]) and two types of media (classroom lecture [CL] and programmed instruction [PI]). We assign 12 students randomly to each of the four possible cells in the design and obtain a score for each subject on the same 50 point test at the end of the semester. The number of correct answers for each subject is as follows:

T & CL	T & PI	M & CL	M & PI
2	9	10	21
5	12	13	25
6	14	14	31
7	15	16	33
4	10	10	22
6	13	13	26
7	14	14	32
8	16	17	34
4	10	11	22
6	13	13	30
7	14	15	32
10	17	17	35

i) Carry out an analysis of variance (fixed effects) testing for:
a) Effects of media
b) Effects of method
c) Interaction effects
Construct the appropriate ANOVA table.

ii) Present the interaction effects graphically. Interpret the graphs in terms of the tests you performed in (i).

iii) Estimate row, column, and interaction effects. How would you estimate the error term for each subject? Illustrate by examples.

iv) Are the factors completely crossed? Are any of the factors nested? Explain and illustrate with comparable experiments (using the same factors)

that show the distinctions you make. Is the concept of replication relevant to this experiment?

v) The analysis performed in (i) can be rephrased in terms of orthogonal comparisons if we treat the factorial design as a one-way analysis-of-variance with four cells. Show this to be true numerically by testing each of the orthogonal comparisons again zero separately (you obviously have to find the orthogonal comparisons first).

vi) Carry out a "post-hoc" (really "planned") test of *all* pairwise comparisons among the four means represented in the factorial design using Tukey's procedure.

vii) Represent schematically a regression model for the analyses carried out in (ii). In particular, specify the design matrix and indicate how each of the tests in (i) could be carried out by comparing Full and Reduced models.