Final Exam

1. Consider the following two-factor fixed effects model:

$$Y_{ijk} = \mu + R_i + C_j + RC_{ij} + +\epsilon_{ijk}, \quad \begin{array}{l} i = 1,2,3; \\ j = 1,2,3; \\ k = n_{ij}. \end{array}$$

   (a) Express the hypothesis $H_o : PMM(R_1) - PMM(R_3) = 0,\ PMM(R_2) - PMM(R_3) = 0$ in terms of the cell means μ_{ij}.

   (b) Use the data below to generate Type III and Type IV hypothesis coefficients. Express the Type IV contrasts for factor R as a contrast in the cell means μ_{ij}. Compare these contrasts to the contrasts in the PMM's.

   (c) Express the Type III contrasts for factor R as a contrast in the cell means μ_{ij}. Again compare these contrasts to the constrasts in the PMM's.

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R  C    Y
1  1   9.2
1  1   8.1
1  3  12.9
2  1  16.1
2  1  15.4
2  2  16.9
3  1  11.6
3  1  10.5
3  2   9.1
3  3   7.2
3  3   6.9
```

2. Analyze the following problem as a split plot design. 4 grocery stores (S) apiece were randomly assigned to offer 5%, 10%, or 15% discounts (D) on an item. Each week, the item in the store was randomly assigned to one of three display categories (C): Featured at end of aisle, Featured in aisle, Not featured. The response was weekly sales in units, and the covariate was weekly wholesale price of the item.

   (a) Ignoring the covariate for now, analyze the data as a split plot model using Yandell's model:

$$Y_{ijk} = \mu + D_i + S(D)_{ij} + C_k + CD_ik + \epsilon_{ijk}$$

   (b) Construct appropriate split plot and whole plot components for the covariate. Print the data set.

   (c) Test the whole plot and split plot covariates and conduct new tests on the whole plot factor, split plot factor and their interaction. Use LSMEANS to interpret significant factor effects.

   (d) Use the SOLUTION option in GLM to obtain estimates of the covariate coefficients; interpret the estimates.