STAT 514 Homework#9 (Due Thursday 11/12/15 BEFORE CLASS)

- Consider a balanced three-factor ANOVA study with factors A, B, and C. Suppose both A and B have fixed effects but C has random effects. Following "Rules for Expected Mean Squares", work out the EMS table, and propose an F-test for each set of the main effects.
 - (a) Assume a restricted mixed effects model.
 - (b) Assume a unrestricted mixed effects model.
- 2. A rocket propellant manufacturer is studying the burning rate of propellant from three production processes. Four batches of propellant are randomly selected from the output of each process, and three determinations of burning rate are made on each batch. The results follow.

	Process 1				Process 2				Process 3			
Batch	1	2	3	4	1	2	3	4	1	2	3	4
	25	19	15	15	19	23	18	-35	14	- 35	- 38	-25
	30	28	17	16	17	24	21	27	15	21	54	29
	26	20	14	13	14	21	17	25	20	24	50	33

- (a) Explain why "batch" is nested under "process".
- (b) Analyze the data and draw conclusions.
- 3. Consider the three-factor factorial model

$$y_{ijk} = \mu + \tau_i + \beta_j + \gamma_k + (\tau\beta)_{ij} + (\beta\gamma)_{jk} + \epsilon_{ijk}$$

where $i = 1, 2, \dots, a$; $j = 1, 2, \dots, b$; $k = 1, 2, \dots, c$. Assuming that all the factors are random, develop the analysis of variance table, including the expected mean squares. Propose appropriate test statistics for all effects.