HW3 (Due: April 25)

1. Assume you have 3 independent normal variables {Y1, Y2, Y3} with mean of {mu1, mu2, mu3} and standard deviation {sigma1, sigma2, sigma3}. Derive the joint density function via 2 ways; one is univariate way and another is multivariate way. Verify if they are equal or not equal. [Remark: Multivariate way can be done using vector and matrix. Remember formula with Determinant? Check its definition. You would be pleasantly surprised you used this in the past!].
2. Show how to convert 1) wide to long form and 2) long to wide form. Provide sample program and output.
3. Using TLC data, reproduce Tables 15 and 16 (in S188 and 191).
4. Using TLC data, you can compute the ‘unadjusted’ means for 8 subgroup (=2 arms at 4 time points). Show how/if you can derive these means from Table 16 – you can pick 3 means if you wish. What do you infer from this?
5. Using TLC data, run the following codes and comment what these codes (=2 different ways) are actually doing.

**proc** **mixed** noclprint=**10** order=data;

class id group time;

model y = group time group\*time / s chisq;

repeated time / type=un subject=id r;

**run**;

**proc** **sort**;

by group descending time;

**proc** **mixed** noclprint=**10** order=data;

class id group time;

model y = group time group\*time / s chisq;

repeated time / type=un subject=id r;

**run**;

[Remark: Non-SAS users can still try this by read-in/copy/paste/click! Not sure if STATA or R has a counterpart of this problem...]

Trivia for Curious George (optional):

<http://en.wikipedia.org/wiki/Determinant#History>

"determinants were first used in the Chinese mathematics textbook The Nine Chapters on the Mathematical Art (九章算術, Chinese scholars, around the 3rd century BCE)."

Determinant and parallelogram

<https://math.okstate.edu/people/binegar/3013-S99/3013-l13.pdf>