

## ST 512 - Lab 10 - Nested Designs

1. Open the `Lab10.sas` file which uses the `Barley` data set. An experiment was done to determine the growth of barley under different salinity concentrations. Three salinity treatments (c, 6b, 12b) were of interest. However, each salinity treatment has specific application methods. For each salinity treatment two application methods were used (generically labeled 1 and 2), but application methods were not common across salinity treatments. Eighteen plants were randomly assigned to the six possible treatment combinations (3 plants per combination).
2. Identify the factors and determine if they are fixed or random, nested or crossed.
3. What model would be appropriate here?
4. Fit the model shown in Code Block #1. What kind of model is being fit?
5. Investigate the effect of salinity. Should we look at the difference of least-squares means for the levels of salinity?
6. Investigate the effect of application. Since there are only two values (1 and 2) of application in the model, does this mean that application 1 is always different from application 2?
7. Code Block #2 is set up for you to run the necessary contrasts on this data. To do so, you'll need to determine the proper contrast coefficients. Fill in the table below (the first one is done for you - just like Lab 04!) and use it to complete Code Block #2.
8. Run Code Block #2 - what can you say about the effects of Salinity and Application(Salinity)?

$\theta$	Effects	Simplification
$\mu_{12b} - \mu_{6b}$	$\frac{(\mu + \alpha_1 + \beta_{(1)1}) + (\mu + \alpha_1 + \beta_{(1)2})}{2} - \frac{(\mu + \alpha_2 + \beta_{(2)1}) + (\mu + \alpha_2 + \beta_{(2)2})}{2}$	$\frac{2\alpha_1 - 2\alpha_2 + \beta_{(1)1} + \beta_{(1)2} - \beta_{(2)1} - \beta_{(2)2}}{2}$