ANOVA Assumptions Lab

Include answers and graphs.

Use “medley.xls”. Run an ANOVA with ZINC$ as the treatment and DIVERSTY as the response variable. Are observations normally distributed, independent, with homogeneity of variance? Include graphs with your answers. Do you need to transform the data? After you run the ANOVA, check the residuals. (Hint, save the residuals as a data file). Do they look skewed?

The file “ANOVA SIMULATION 2012 n=10 v13.txt” is a command file for SYSTAT that conducts 1000 ANOVA’s using randomly generated data from the distribution you specify. We will use this tool to examine the effects of non-normal data and heterogenous variances on Type 1 error rates.

First, take a look at the code in the text file and figure out what it will do when you run it. Once you understand the code, open a new data file by File>New>Data. Then run the code. It’s easiest to copy the text to the clipboard and then click File>Submit>Clipboard. Wait for a bit as it’s running 1000 ANOVA’s by manual calculation. On my machine it only takes a couple of seconds typically, but these machines may be slower.

Use each of the following distributions (and some others you prefer). First look at the effect of using a non-normal distribution on Type 1 error, and then look at the effect of heterogenous variance with a normal distribution. Describe how violation of these assumptions affect Type 1 error rate.

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| Distribution | Code | Example |
| Normal | ZRN(mean, std) | ZRN(0,1) will generate a normal distribution of mean=0 and std=1, your generic bell curve |
| Uniform | URN(low, high) | URN(1,3) will generate random data from a uniform distribution ranging from 1 to 3 |
| Lognormal | LNRN(loc, sc) | LNRN(0,1) will generate a lognormal distribution with mean 0 and standard deviation 1 |

Can you simulate heterogeneous variances? How robust is ANOVA to this assumption violation?