Social Dilemmas **Sampling and Standard Error Lab**

Introduction:
When taking a sample of size n from a larger population, we use the mean of the sample, $\bar{x}$, to estimate the mean of the population μ. Since this is an estimate, we would like to know approximately how close to the actual mean our estimate is likely to be. A good measure of the accuracy of our estimate is the standard error $\sigma_{x..}$ The standard error is the standard deviation the sample means. That is, if we were to take many different samples and calculate the means then the standard error is the standard deviation of the means. The smaller the standard error, the closer our sample mean is to the population mean. Typically we usually only take one sample, so we estimate the standard error as follows: if s is the standard deviation of our sample of size, n, then the standard error is $\sigma_x = \frac{s}{\sqrt{n}}$.

In this lab we will explore these ideas using a population data set generated by the class.

Procedure:

1. Visit the website www.predictablyirrational.com. Click on the demonstrations link and choose the Easy Hard demonstraton. Read the instructions carefully, so that you understand the objective first, and then complete the task as quickly as you can. When you have completed the task, enter the the time you obtained on the *dissimilar* task and the time you obtained on the *similar* task on the webform listed on the class webpage.
2. Complete the other demonstrations on the predictably irratinal website while you wait for other students to complete the task and fill in the webform.
3. When the webform is complete, Use Excel to open the *easyhard.xls* file from the Social Dilemmas handouts folder on Orca. This file will have two data sets. One will be for the *dissimilar* task and one for the *similar* task. Find the mean and standard deviation of each data set. You may use the AVERAGE() and STDEV() Excel function to do this. We will refer to these results as the population mean μ and standard deviation, σ.
4. Now take a random sample of ten values from each of the two data sets. To do this enter the forumla =Rand() in each cell of a new column and then sort all columns by this column. Your sample will be the top 10 values of each data set. Copy these values to a new column.
5. Calculate the the sample mean, $\bar{x}$, the sample standard deviation s, and the standard error $\sigma_x = \frac{s}{\sqrt{n}}$ for each of your two samples.
6. Enter the mean value for both of your samples on the same webform as previously.
7. Using your standard error find the z-value of your sample mean, relative to the population mean. How likely is it that your z-value is as high as it is? Was your sample mean a good estimate of the population mean?
8. When all students have entered their sample means for both data sets on the web form, use Excel to open the *samplemeans.xls* file from the Social Dilemmas handouts folder on Orca. Find the mean and standard deviation of the sample means. Is the mean of the sample means close to the population mean? Is the standard deviation of the sample means is close to the standard error. Plot a historgram of the data. Does it appear to be normally distributed?
9. When you have finished your spreadsheet upload it using the link on our program webpage. Also, write a short minipaper comparing the times of the dissimilar and similar tasks. In your paper address whether your statistics support the case that the similar task takes signficantly longer than the dissimilar one. Explain and comment on Ariely's claim that if we want to get the most answers right in two minutes we ought to take less time on the similar task rather than more. Both of these assignments are due by Wednesday Nov 4th.