

IE 361 Lab#1/ 1st Measurement Study

(Name)

Before making each measurement, close the jaws of the caliper and reset the "zero" on the dial.

- First, measure "the size" of each foam nugget in your bag once. Let everyone at your table do the same. Then put the peanuts back in your bag and exchange bags with another table and measure "the size" of each peanut in the second bag once (You will measure eight peanuts once apiece.) Record your own measurements below (to 1/100th of an inch).

Gauge:	
Foam Peanut Number	Measured Size

- Again exchange bags with another table. Take a single nugget out of that bag and measure it. Let everyone at your table do the same. Then repeat this 5 more times. (Everyone at the table measures the same peanut six times by the time you are done.) Record your own measurements below (again to 1/100th of an inch).

Gauge:	Peanut Number:

Now compute both the sample mean and the sample standard deviation for both sets of numbers you collected (these are "samples" of size $n = 8$ and $n = 6$ respectively). What are the units? Report these figures to one more decimal place than you measured individual values to.

First "Sample" (of $n = 8$ measurements):

$\bar{y} =$ _____ $s =$ _____

Second "Sample" (of $n = 6$ measurements):

$\bar{y} =$ _____ $s =$ _____

How do the two standard deviations above compare? (Which is larger?) Why should one expect (or not expect) this?

List below the sample means and sample standard deviations obtained by everyone at your table when measuring the same peanut six times with the same gauge.

	Student 1	Student 2	Student 3	Student 4	Student 5
\bar{y}					
s					

In qualitative terms, do you see clear evidence that one of the students at your table is more precise in his or her measuring than all of his or her peers? Explain.

In qualitative terms, do you see clear evidence that two of the students at your table have different bias for measuring the peanut? Explain.

Based on the measurements recorded or summarized (above) during the lab session, after viewing Modules 2 and 3 complete the following.

1. Find 95% two-sided confidence limits for the sum of the mean peanut size and your own measurement bias in measuring the sizes.

2. Find 95% two-sided confidence limits for the sum of the single (last or 9th) peanut size plus your own measurement bias in measuring sizes.

3. Give 95% two-sided confidence limits for your own (repeatability) standard deviation of measurement (on a fixed peanut).

4. Give 95% two-sided confidence limits for comparing biases of Students 1 and 2.

5. Give 95% two-sided confidence limits for comparing the measurement standard deviations of Students 1 and 2.