COMPARING SAMPLE MEANS (PART 2 PAIRED DATA)

CHEM 251 SDSU

PAIRED OR UNPAIRED

- In comparing means we need to first identify the type of data set that we are dealing with.
- The measurements could be **paired**, or **unpaired**.
- With **paired** data, the same samples are measured with each analysis.
- With **unpaired** data, the sample is split and part is measured by each analysis.

TESTING A NEW METHOD

- We are developing a new method of analysis and we want to compare it to an established method. What samples do we use to test the new method?
- Ideally, we should test a range of sample concentrations to look at how the new system is capable of analyzing the full range of potential results.
- Measuring only high or low concentrations could prevent the identification of errors in the new analysis method.

PAIRED DATA

- Paired data is used when comparing the results from two different methods, when a large variance in the population could negatively impact the *t*-test of means.
- In these tests, multiple samples, of different sample concentrations, are measured once each by each analysis method.
- It will then be the difference in these measurements that will be compared.

SAMPLE DATA

Sample	Method A	Method B	*d*
#1	125	136	-11
#2	3.54	4.82	-1.28
#3	49.5	47.3	2.2
#4	18.4	23.1	-4.7
#5	106	98.7	7.3
#6	258	271	-13
s_d	7.8	Average *d*	-3.413

$$t_{exp} = \frac{|\overline{d}|\sqrt{n}}{s_d}$$

- t_{exp} is calculated and compared to the tabulated values.
- The calculations are based on the average difference and the standard deviation of the differences in the measurements.
- *n* is the number of paired samples, in this case 6.
- The degrees of freedom are *n*-1.

SAMPLE QUESTION

- Is there a difference in the values being reported by methods A and B at the 95% confidence level?

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