

You should download the Vitiam Intake dataset from our course website for this quiz. The investigation here will be centered on intake of Calcium (mg/day).

Research Question: Do statistical differences exist, on average, between the actual and daily recommended intake of Calcium for college students at Winona State University?

- The goal of this study is to compare the Actual Intake of Calcium to the Daily Recommended Intake (DRI) of Calcium. A statistician would immediately calculate the differences between Actual and DRI and complete the analysis using these differences. Suppose instead your friend decides to complete his analysis by simply comparing the Actual column to the DRI column as is shown here.

	A	B	C	Vitiam C			Calcium		
	ID	Gender	BMI	Actual	DRI	Difference	Actual	DRI	Difference
3	1	F	22.5	29	65	-36	761	1300	-539
4	2	F	19.7	295	75	220	928	1000	-72
5	3	F	23.1	355	75	280	783	1000	-217
6	4	F	21.5	109	75	34	1646	1000	646
7	5	F	22.3	5	65	-60	295	1300	-1005
8	6	F	21.8	72	75	-3	2091	1000	1091
9	7	F	23.4	62	75	-13	1146	1000	146
10	8	F	21.8	34	75	-41	775	1000	-225

Averages for each column

Average	
Actual	948
DRI	1114

Why is this statistically a bad idea? Discuss. (3 pts)

Taking an average of the Actual column separate from DRI column does not allow for the within person comparisons that should be done. The people in this study have different DRI values for Calcium; thus, a proper analysis should consider the difference between the actual value and DRI value for each person.

For the remaining questions, assume the Difference column is used for the analysis.

$$\text{Difference} = \text{Actual} - \text{DRI}$$

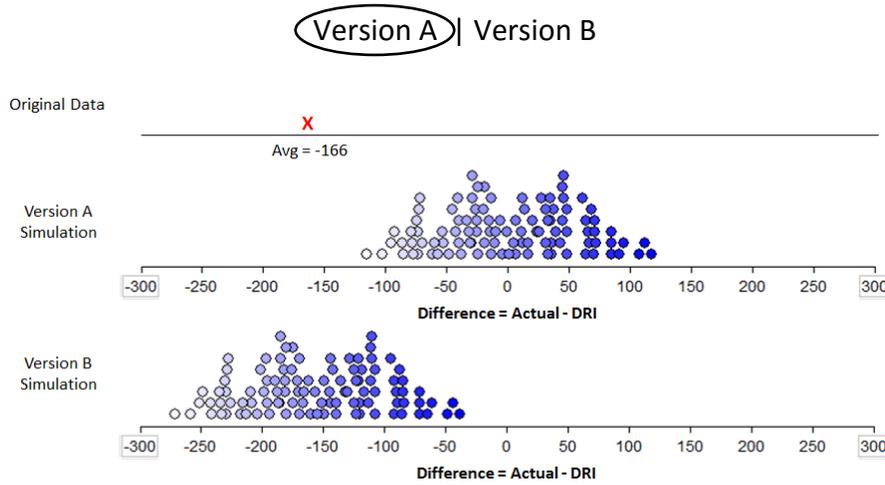
	A	B	C	Vitiam C			Calcium			Iron		
	ID	Gender	BMI	Actual	DRI	Difference	Actual	DRI	Difference	Actual	DRI	Difference
3	1	F	22.5	29	65	-36	761	1300	-539	38	15	23
4	2	F	19.7	295	75	220	928	1000	-72	29	18	11
5	3	F	23.1	355	75	280	783	1000	-217	22	18	4
6	4	F	21.5	109	75	34	1646	1000	646	30	18	12
7	5	F	22.3	5	65	-60	295	1300	-1005	3	15	-12
8	6	F	21.8	72	75	-3	2091	1000	1091	15	18	-3
9	7	F	23.4	62	75	-13	1146	1000	146	9	18	-9
10	8	F	21.8	34	75	-41	775	1000	-225	8	18	-10
11	9	F	23.9	24	75	-51	560	1000	-440	11	18	-7

I computed the average of the difference column for Calcium and got -166.

- What does this value of -166 mean? That is, what is the practical interpretation of this value? Discuss. (3 pts)

On average, a person in this study consumes about 166 mg of Calcium less than their daily recommended intake.

3. Conceptual, computing the p-value requires that our original summary measurement, i.e. the average value for the difference column, be compared against repeated outcomes under the situation of no difference between these two groups. Which version, i.e. A or B, should be used to compute the p-value for this problem? Provide a rationale for your selection. (3 pts)



Rationale for your selection.

Version A is the correct reference distribution. The outcome from our study, i.e. -166, should be compared against the “no difference” situation. The Version A simulation has the points correctly centered about 0 – which represents no difference.

4. Run the appropriate =TTEST() analysis in Excel for the following research question. (5 pts)

Research Question: Do statistical differences exist, on average, between the actual and daily recommended intake of Calcium for college students at Winona State University?

	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
1	Calcium				Iron							
2	Actual	DRI	Difference		Actual	DRI	Difference	Test Value				
3	761	1300	-539		38	15	23	0		=TTEST(S3:S73,X3:X73,2,1)		
4	928	1000	-72		29	18	11	0		0.0013		
5	783	1000	-217		22	18	4	0				

Use =TTEST(Array1, Array2, Number of Tails, Type of Test) function in Excel to get the p-value.

Identify the following values that you used in the =TTEST() function in Excel.

- Values used in Array1: S3 : S73
- Values used in Array2: X3 : X73
- Value used for Number of Tails: 2 (two-tailed test)
- Value used for Type of Test: 1 (1 = analysis uses differences)

What is the p-value returned by Excel?

- P-value: 0.0013

5. Make a statistical decision and provide a conclusion using laymen's language for the research question. (3 pts)

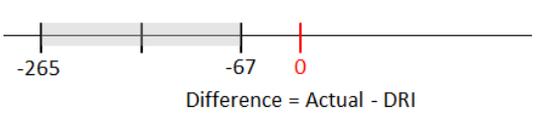
Decision:

- Data supports the research question
 Data does not support the research question

Conclusion. Use laymen's language to give a conclusion for this analysis.

There is enough statistical evidence to say that, on average, differences exist between the actual and daily recommended intake of Calcium for college students at Winona State University (p-value = 0.0013).

I have computed a 95% confidence interval for the average difference between actual intake and daily recommended intake for calcium.

Visual Representation of 95% CI	Formula Representation of 95% CI
 <p style="text-align: center;">Difference = Actual - DRI</p>	<p><i>Lower Endpoint</i> = $-166 - \left(1.99 * \frac{418.7}{\sqrt{71}}\right) = -265$</p> <p><i>Upper Endpoint</i> = $-166 + \left(1.99 * \frac{418.7}{\sqrt{71}}\right) = -67$</p>

6. Interpret the meaning of this interval in the context of this problem? What is the practical interpretation of this interval? Discuss. (3 pts)

This interval suggests that a Winona State student is not consuming enough calcium. In particular, this interval suggest that, on average, a Winona State student is anywhere from 67 mg to 265 mg deficient in their calcium intake.