

Biostatistics Practice Problem #1

The following data sets are measurements made of the thickness (mm) of shells of the snail *Littorina obtusata* found in the rocky intertidal of New England. Snails were collected from sites with crab predators and without crab predators.

Habitat	Thickness (mm) of shells of the snail <i>Littorina obtusata</i>											
With Crabs	1.02	0.88	0.75	0.94	0.81	0.98	0.79	0.83	0.86	0.93	0.91	1.05
Without Crabs	0.71	0.78	0.55	0.42	0.61	0.58	0.49	0.33	0.36	0.82	0.62	0.54

PART A: Standard Deviation

1. Calculate the mean snail shell thickness with crabs and without crabs. Be sure to show at least one example calculation.
2. Calculate the standard deviation of snail shell thickness with crabs and without crabs. Be sure to show at least one example calculation.
3. Summarize your results in a complete data table.
4. Which site has snails with thicker shells? Suggest a reason for this finding.
5. For which site is the snails' shell thickness more variable?

PART B: Standard Deviation in Excel (see www.biologyforlife.com for guidance on using Excel for mean and SD).

1. Use Excel to create a data table and determine the mean and standard deviation of shell thickness for crabs in the two habitats. Be sure your data and answers have the correct number of digits.
2. Create a graph depicting the mean and standard variation for the data provided.
3. Print your data table and graph.
4. Based on your graph, explain whether the shell thickness is significantly different in the two populations.

PART C: T-Test

1. Complete a t-test for the growth of plants in batch 1 and batch 2. Show your working.
2. Explain if the growth is significantly different in the two plant batches. How do you know?

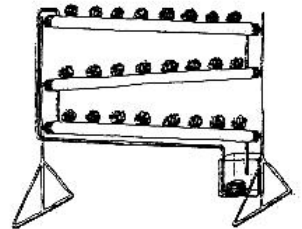
Biostatistics Practice Problem #2

Hydroponics is a method of growing plants in nutrient rich water without the use of soil. It can enable accelerated growth rates, and growth without the use of herbicides and pesticides in a controlled environment. A hydroponics expert is fine tuning her levels of phosphorus with the growth of lettuce and has grown two separate batches. She hopes that the final growth of the lettuce with the new fertilizer levels (batch 1) will be greater than the old level of phosphorus (batch 2).

She measured plant growth in cm with an uncertainty of ± 0.5 cm. The data is:

BATCH 1: 4.5, 5.9, 4.3, 6.6, 6.1, 5.5, 5.8, 5.4, 5.2, 4.9, 5.7, 5.3, 6.0, 4.9, 6.2,

BATCH 2: 6.0, 5.5, 5.2, 5.0, 4.8, 4.6, 4.6, 5.0, 5.3, 4.8, 5.6, 5.8



PART A: Standard Deviation

1. Calculate the mean growth of plants in batch 1 and batch 2. Be sure to show at least one example calculation.
2. Calculate the standard deviation of the mean growth of plants in batch 1 and batch 2. Be sure to show at least one example calculation.

PART B: Standard Deviation in Excel (see www.biologyforlife.com for guidance on using Excel for mean and SD).

1. Create a final draft quality data table to present the data and calculated results.
2. Create a graph in Excel depicting the mean and standard variation for the data provided. Be sure your data and answers have the correct number of digits.
3. Print your data table and graph.
4. Based on your graph, explain whether the shell thickness is significantly different in the two populations.

PART C: T-Test

5. Complete a t-test for the growth of plants in batch 1 and batch 2. Show your working.
6. Explain if the growth is significantly different in the two plant batches. How do you know?