

COSC150: Laboratory 3 (19 January 2020)

The Look and Feel of Zero; How do Variances Vary and Deviations Deviate?

Scientific Investigation of Driving Questions: Using Excel or Google Sheets as your “sand box,” conduct a scientific investigation to shed light on the following driving questions and enter your **result** for each in <https://tinyurl.com/COSC150SharedMeasures> :

NOTE: if you use Google Sheets for the exercise, use a separate sheet from the shared one.

What are the practical limits of computation using laptop/desktop digital computers?

- a. What is the largest positive number x that can be represented as a floating-point numeral? How do you know?
- b. What is the largest positive integer I that can be represented as an integer? How do you know?
- c. What is the smallest positive number that can be represented as a floating-point numeral? How do you know?
- d. Consider a., b., and c., above but consider the limits of negative numbers. Is the floating-point model of arithmetic symmetric?
- e. What is the largest positive number x when added to 1 still returns 1?
- f. What is the largest positive number x when evaluated as $\cos(x)$ still returns $\cos(0)$?

Follow Along and do these exercises individually using either Excel or Google Sheets, but enter your result for each in <https://tinyurl.com/COSC150SharedMeasures> :

- a. What is the AVERAGE 10 random numbers (use =RAND())?
- b. What is the VARIANCE of 10 random numbers?
- c. What is the Standard Deviation (use =STDEV) of 10 random numbers?
- d. What is the STANDARD ERROR (use =STDEV/SQRT(N-1))
- e. Are these measures consistent with expectations? Are these consistent if repeated?
- f. What is the AVERAGE 100 random numbers (use =RAND())?
- g. What is the VARIANCE of 100 random numbers?
- h. What is the Standard Deviation (use =STDEV) of 100 random numbers?
- i. What is the STANDARD ERROR of 100 random numbers =STDEV/SQRT(N-1)
- j. Are these measures consistent with expectations? Are these consistent if repeated?
- k. What is the AVERAGE 1000 random numbers (use =RAND())?
- l. What is the VARIANCE of 1000 random numbers?
- m. What is the Standard Deviation (use =STDEV) of 1000 random numbers?
- n. What is the STANDARD ERROR of 1000 random numbers =STDEV/SQRT(N-1)
- o. Are these measures consistent with expectations? Are these consistent if repeated?

By Thursday, turn (via e-mail to panoffrm@wofford.edu) in a 2-3 (PDF) page write up of these explorations using template

Title

Author

Abstract (1-2 sentences that summarize your effort)

Intro background, driving questions

Procedure

Results/Observations/Data

Analysis, reflection

Conclusions (if any)