**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?

* 1. What is the largest positive number *x* that can be represented as a floating-point numeral? How do you know?
  2. What is the largest positive integer *I* that can be represented as an integer? How do you know?
  3. What is the smallest positive number that can be represented as a floating-point numeral? How do you know?
  4. Consider a., b., and c., above but consider the limits of negative numbers. Is the floating-point model of arithmetic symmetric?
  5. What is the largest positive number *x* when added to 1 still returns 1?
  6. 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> :

1. What is the AVERAGE 10 random numbers (use =RAND() )?
2. What is the VARIANCE of 10 random numbers?
3. What is the Standard Deviation (use =STDEV) of 10 random numbers?
4. What is the STANDARD ERROR (use =STDEV/SQRT(N-1) )
5. Are these measures consistent with expectations? Are these consistent if repeated?
6. What is the AVERAGE 100 random numbers (use =RAND() )?
7. What is the VARIANCE of 100 random numbers?
8. What is the Standard Deviation (use =STDEV) of 100 random numbers?
9. What is the STANDARD ERROR of 100 random numbers =STDEV/SQRT(N-1)
10. Are these measures consistent with expectations? Are these consistent if repeated?
11. What is the AVERAGE 1000 random numbers (use =RAND() )?
12. What is the VARIANCE of 1000 random numbers?
13. What is the Standard Deviation (use =STDEV) of 1000 random numbers?
14. What is the STANDARD ERROR of 1000 random numbers =STDEV/SQRT(N-1)
15. Are these measures consistent with expectations? Are these consistent if repeated?

By Thursday, turn (via e-mail to [***panoffrm@wofford.edu***](mailto: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)