COSC150: Laboratory 2 (21 September 2021)

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 the end of the day Thursday, turn (via e-mail to ***panoffrm@wofford.edu***) 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)