FIT3139: Applied Session Week 1

Instructions

- This is your first Applied Session. It works as a combination of theory and practice, based on the content of the previous week.

- You are encouraged to ask questions and discuss the content with your tutor and your classmates

- Your demonstrator will guide you through the sets of questions below. These questions work as a guideline for discussion.

A. Breaking the ice without ackwardness

Discuss with other classmates and your tutor:

- what do you study

- why are you taking the unit

- what do you expect from the unit

B. Binary numbers

- Using your software environment, create a function to convert integer numbers to its binary representation and viceversa

C. Calculus fundamentals

Please make sure you have watched the videos listed under Applied Session resources on Moodle.

D. Differentiation

- The derivative of a function $f(x)$, denoted $f'(x)$ is defined as:

$$f'(x) = \lim_{\delta \to 0} \frac{f(x + \delta) - f(x)}{\delta}$$

what does this mean in graphical terms? draw a graph to illustrate the concept.

- Using the definition, derive the derivative of $f(x) = 5x^2$

- Use the graphical intuition above to create a computer program that can approximate the derivative of any arbitrary function. Visualise your results with plots [1].

[1] In python you can use Matplotlib, with the function plot in the package matplotlib.pyplot

C. McLaurin Series

- What is the McLaurin series of the function $f(x) = e^x$?

- Use a computer program to show how the true function is approximated by the series for a specific value of x, and how this approximation improves with more terms in the series.

- Use a plot to show the approximation for different values of x and different numbers of terms in the series