REMEMBER TO HAND PROBLEMS BEFORE THE TUTORIAL STARTS

• Derivatives

Problem 1 Compute the average rate of change of the function

$$f(x) = \frac{x^2 + 1}{3}$$

between

1. $x_1 = 1$ and $x_2 = 2$ 2. $x_1 = 1$ and $x_2 = 1.1$ 3. $x_1 = 1$ and $x_2 = 1.01$ 4. $x_1 = 1$ and $x_2 = 0.99$ 5. $x_1 = 1$ and $x_2 = 0.9$ 6. $x_1 = 1$ and $x_2 = 0.5$

Problem 2

- If f(x) is continous at x = a, is it differentiable?.
- If f(x) is differentiable x = a, is it continous?.

Problem 3 Compute the derivative of the following function and explain how you did the computation

$$f(x) = \sqrt{3x^4 + 12x^2 + 1}$$

Problem 4 Compute, using the limit definition, the derivative of

$$f(x) = \frac{x^2 + 1}{3}$$

 $at \ x = 1.$

Then compute the derivative function f'(x) using the rules for derivation, and check that the previous result is correct.

Problem 5 Compute the derivative of the following function and explain how you did the computation

$$f(x) = \frac{\sin(3x^4 + 12x^2 + 1)}{x^2 + 1}$$