MATH 100, Tutorial 3
(Week of January 29, 2024)

Pre-lab Preparation

Before most lab sessions you will need to do some preparation work. Your lab instructor may call upon you to present your answer to the class. It is important to try each of these even if you can not complete them correctly. You must bring your written answers to your lab session and it will be marked at the beginning.

For this week you need to:

- Do exercise 1-part (a) [2 points] and exercise 2- part (a) [3 points]

Exercise 1 *Use the definition of derivative to find $f'(a)$ in the following*

(a) $f(x) = \dfrac{1}{\sqrt{x}}, \quad a = 4$

(b) $f(x) = x^2 + 9x, \quad a = 2$

Exercise 2 *Use the definition of a derivative to show that the functions below are not differentiable at $x = 1$.*

(a) $f(x) = \begin{cases} 4\sqrt{x}, \ 0 \le x \le 1 \\ 6x - 2, \ x > 1. \end{cases}$

(b) $f(x) = \begin{cases} -2x^2 + 4, \ 0 \le x \le 1 \\ 2x, \ x > 1. \end{cases}$

Exercise 3 *Find $f'(x)$ in the following cases*

(a) $f(x) = 8x \left(8x^4 + \dfrac{13}{x + 1} \right).$

(b) $f(x) = \dfrac{4x^3 - 2x + 1}{x^2}$

Exercise 4 *Determine all points on the graph of $f(x) = x^3 + x^2 - x - 1$ for which*

(a) *the tangent line is horizontal*

(b) *the tangent line has a slope of -1.*

Exercise 5 *Find the equation of the tangent line to the graph of $f(x) = x^2 + \dfrac{4}{x} - 10$ at $x = 8$.*