Math 135, Calculus 1, Fall 2020

Written Homework 09-25

Directions: Write your solutions neatly and clearly, and submit to Canvas. In these problems, you should show all of your work in complete mathematical "sentences", writing complete English sentences when you explain your logic. You are free (and encouraged!) to work with others, but make sure the solutions you write up your solutions indepedently.

Exercise 1 (4 points). Sketch the graph of an example of a function f that satisfies all of the given conditions:

- $\lim\limits_{x \to 1} f(x) = 2$

- $\lim\limits_{x \to 3^-} f(x) = -4$

- $\lim\limits_{x \to 3^+} f(x) = 4$

- $f(1) = 0$

- $f(3) = 4$

Exercise 2 (4 points). Sketch the graph of the function $f(x)$ defined below, and use it to determine the value of a for which $\lim\limits_{x \to a} f(x)$ does not exist.

$$f(x) = \begin{cases} 1 + \sin(x) & \text{if } x < 0 \\ \cos(x) & \text{if } 0 \le x \le \pi \\ \sin(x) & \text{if } x > \pi \end{cases}$$

Exercise 3 (2 points).

(a) What is wrong with the following equation?

$$\frac{x^4 - 8x^2 + 16}{x^2 - 4} = x^2 - 4$$

(b) In view of part (a), explain why the equation

$$\lim_{x \to 2} \frac{x^4 - 8x^2 + 16}{x^2 - 4} = \lim_{x \to 2}(x^2 - 4)$$

is correct.