

MATH 131: ASSIGNMENT 3

Limits and Continuity

Book reference: Sections 1.2, 1.3, 1.4

Complete the following problems from the book:

- Section 1.2: problem 9
- Section 1.3: problems 1, 5, 7, 13
- Section 1.4: problems 15 and 16: don't worry about Definition 4.1 – just tell me in which of the three ways the function fails to be continuous
- Section 1.4: problems 1, 2, 3, 4, 5, 33, 34, 35, 62

Then complete the following:

Exercise 3.1. Go to <https://www.desmos.com/calculator> and put in the function

$$f(x) = \frac{\sin(x)}{x}.$$

Using the calculator, determine the limit $\lim_{x \rightarrow 0} [f(x)]$.

Exercise 3.2. Let $g(x) = \frac{\sin(2x)}{x}$. Notice that we can write

$$g(x) = \frac{2}{1} \frac{\sin(2x)}{2x}.$$

Use this, together with the result of the previous exercise, to compute $\lim_{x \rightarrow 0} [g(x)]$.

Exercise 3.3. Compute $\lim_{x \rightarrow 0} \left[\frac{\sin(5x)}{2x} \right]$.

Exercise 3.4. Use the Desmos calculator to find $\lim_{x \rightarrow 0} \left[\frac{1 - \cos(x)}{x^2} \right]$.

Exercise 3.5. Locate and write down the trigonometric identities for $\cos(x + y)$, $\sin(x + y)$, $\cos(2x)$, and $\sin(2x)$.