HW 4: Section 1.4

Due: Monday, September 16th in SQRC by 9pm

Learning Goals:

- Evaluate limits of polynomials, rational functions, trig functions, exponential functions, logarithmic functions, and piece-wise functions.

- Evaluate limits of the product and quotient of functions.

- Evaluate limits where the denominator approaches 0.

- Evaluate limits where x approaches infinty.

Questions:

1. Problem 1.4.8.Determine where $x \cot(x)$ is continuous.

2. Problem 1.4.16. Explain why the function $\dfrac{e^{x-1}}{e^x - 1}$ fails to be continuous at $x = 0$ by indicating which of the three conditions of definition 4.1 (really read the remark 4.1 next to the definition) are not met.

3. Problem 1.4.22. Determine the interval on which $\sqrt{x^2 - 4}$ is continuous.

4. Problem 1.4.38. Use the graph (in the book) to identify all intervals on which the function is continuous.

5. Problem 1.4.40. Determine values of a and b that make the function continuous

$$f(x) = \begin{cases} ae^x + 1 & \text{if } x < 0 \\ \arcsin\left(\frac{x}{2}\right) & \text{if } 0 \le x \le 2 \\ x^2 - x + b & \text{if } x > 2 \end{cases}$$

6. Problem 1.5.2. Evaluate $\displaystyle\lim_{x \to -1} \frac{1 - 2x}{x^2 - 1}$ by given a number, $\infty, -\infty$ or DNE.

7. Problem 1.5.2. Evaluate $\displaystyle\lim_{x \to \infty} \frac{2x^2 - x + 1}{4x^2 - 3x - 1}$ by given a number, $\infty, -\infty$ or DNE.