MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

Assignment 2

MATHEMATICS 1000

Fall 2025

Due: Monday, September 29th, 2025 at 6:00pm. See the Gradescope Handout for submission information.

Note: You should complete the WeBWorK problem sets "Basic Limit Properties" and "Evaluating Limits Algebraically", as well as Worksheets 1.3 and 1.4, before you work on this assignment.

1. Use analytical methods to evaluate each of the following limits. If a limit does not exist, explain why. Assign ∞ or $-\infty$ to the limit where appropriate.

(a)
$$\lim_{x \to 4} \frac{3 - \sqrt{x+5}}{\sqrt{4x-7} - 3}$$

(b)
$$\lim_{h \to 0} \left(\frac{3}{h} - \frac{6}{h\sqrt{7h+4}} \right)$$

(c)
$$\lim_{x \to 0} \frac{\sin^3(2x)}{x^2 \sin(5x)}$$

2. Find all values of k for which $\lim_{x\to -2} f(x)$ exists, given

$$f(x) = \begin{cases} k^2 x, & \text{for } x < -2\\ k - 6, & \text{for } x = -2\\ 4k - x, & \text{for } x > -2 \end{cases}$$

3. Determine all the vertical asymptotes, if any, of the function

$$f(x) = \frac{9 - x^2}{x^3 + 3x^2}.$$

For each vertical asymptote, assign $\pm \infty$ to the lefthand and righthand limits.