

# MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

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ASSIGNMENT 3

MATHEMATICS 1000

FALL 2023

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**Due: Wednesday, October 11th, 2023 at 4:00pm. SHOW ALL WORK.**

**Note:** You should complete the WebAssign problem set “Limits at Infinity”, as well as Worksheets 1.5, 1.6 and 1.7, before you work on this assignment.

1. Find all the horizontal asymptotes, if any, to the graph of the function

$$f(x) = \frac{5x + 7}{3x - \sqrt{9x^2 + 2}}.$$

2. Given the function

$$f(x) = \begin{cases} \frac{x^2 + (k - 3)x - 3k}{x^2 - (k + 3)x + 3k}, & x \neq 3 \\ kx - k + 1, & x = 3 \end{cases}$$

use the definition of continuity to determine all values of the constant  $k$  for which  $f(x)$  is continuous at  $x = 3$ .

3. Given the function

$$f(x) = \begin{cases} \frac{x - 3}{x^2 - 1}, & \text{for } x < 0 \\ \frac{x^2 + 2x - 8}{x - 2}, & \text{for } 0 \leq x < 4 \\ \frac{2x}{x - 3}, & \text{for } x \geq 4 \end{cases}$$

use the definition of continuity to investigate the continuity of  $f(x)$  at each of the following. Classify any discontinuities as removable or non-removable.