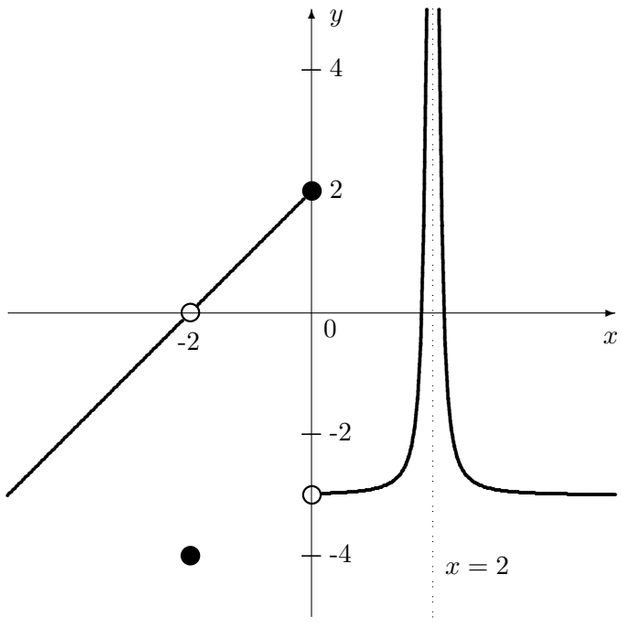
MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

TEST 1 **MATHEMATICS 1000-003** OCTOBER 5TH, 2022

Name	**MUN Number**

[12] 1. Use the graph of $y = f(x)$ below to determine each of the following. Label the limits as ∞ or $-\infty$ where appropriate. If the limit does not exist or the value of the function is undefined, indicate this.



(a) $f(2) =$

(b) $\lim_{x \to 2^-} f(x) =$

(c) $\lim_{x \to 2^+} f(x) =$

(d) $\lim_{x \to 2} f(x) =$

(e) $f(0) =$

(f) $\lim_{x \to 0^-} f(x) =$

(g) $\lim_{x \to 0^+} f(x) =$

(h) $\lim_{x \to 0} f(x) =$

(i) $f(-2) =$

(j) $\lim_{x \to -2^-} f(x) =$

(k) $\lim_{x \to -2^+} f(x) =$

(l) $\lim_{x \to -2} f(x) =$

[16] 2. Determine each of the following limits. If a limit does not exist, explain why.

(a) $\lim_{x \to -3} f(x)$ where $f(x) = \begin{cases} \dfrac{6x+18}{9-x^2}, & \text{for } x \leq -3 \\ \dfrac{3-5x}{9+x^2}, & \text{for } x > -3 \end{cases}$

(b) $\lim_{x \to 2} \dfrac{x^2 - 2x}{3x - \sqrt{7x^2+8}}$

(c) $\lim_{x \to 0} \dfrac{\sin^2(3x)}{x \sin(4x)}$

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

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

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

[4] 4. Consider the functions

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

(a) Is the statement "$f(x) = g(x)$" true or false? Briefly explain your answer.

(b) Is the statement "$\lim_{x \to 3} f(x) = \lim_{x \to 3} g(x)$" true or false? Briefly explain your answer. If your answer is different from that of part (a), be sure to indicate how this is possible.

[40]