Name: _____

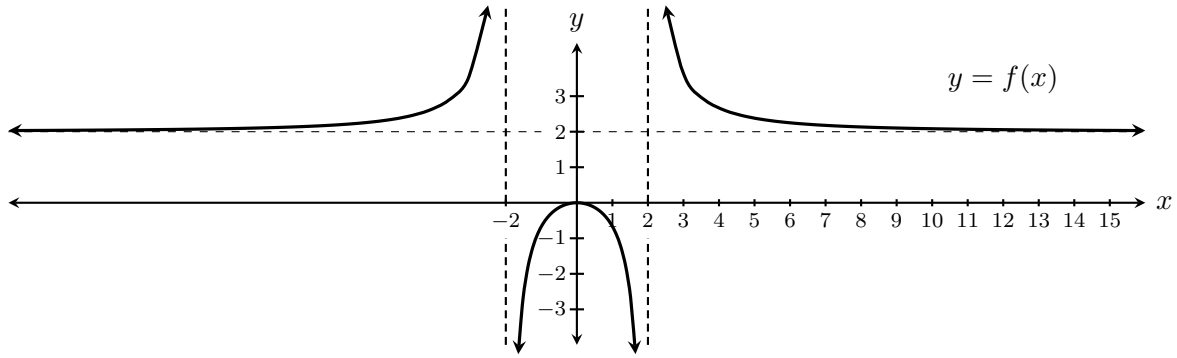
Test 1 ♣

MATH 200

February 6, 2026

Directions: Each problem is 5 points unless stated otherwise. Closed book, no calculators. Put phones away.

1. (6 points) Answer the following questions about the function $y = f(x)$ graphed below.



(a) $\lim_{x\to\infty} f(x) =$

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

(c) $\lim_{x\to-\infty} \sin\left(\frac{\pi}{3f(x)}\right) =$

(d) $\lim_{x\to 0} \cos^{-1}(f(x)) =$

(e) $\lim_{x\to 2} \frac{1}{f(x)} =$

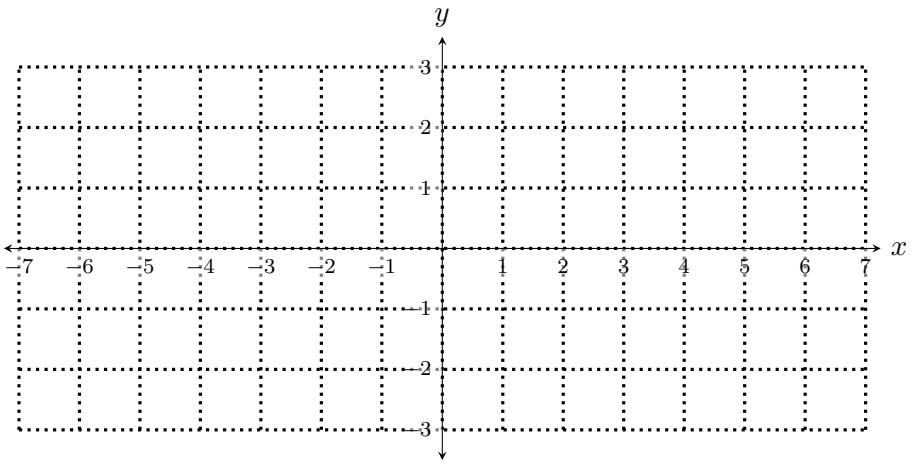
(f) $\lim_{x\to 0} \frac{1}{f(x)} =$

2. (4 points) The function $f(x)$ graphed in problem 1 above is a rational function. Give a possible algebraic expression for it.

$f(x) =$

3. (5 points) Draw the graph of a function that is continuous at all values of x **except** x=1 & x=3, *and* meets all of the following conditions.

- $\lim_{x\to 1^+} f(x) = -\infty$
- $\lim_{x\to 1^-} f(x) = \infty$
- $\lim_{x\to-\infty} f(x) = 1$
- $\lim_{x\to\infty} f(x) = -1$
- $\lim_{x\to 3} f(x) = 1$



4. State the intervals on which the function $f(x) = \dfrac{\ln(x)}{x^2 - x - 6}$ is continuous.

5. $\lim\limits_{h \to 0} \dfrac{\dfrac{1}{7+h} - \dfrac{1}{7}}{h} =$

6. $\lim\limits_{x \to 1} \dfrac{x^2 - 1}{8x^2 - 8x} =$

7. $\lim\limits_{x \to \infty} \left(\dfrac{x^2 - 3x + 2}{8x - 8x^2} \right)^{1/3} =$

8. $\lim_{x \to \pi} \dfrac{\cos(x)}{1 + \cos(x)} =$

9. $\lim_{x \to 0} \dfrac{\cos(x)}{1 + \cos(x)} =$

10. Use a limit definition of the derivative to find the derivative of $f(x) = 2\sqrt{x}$.