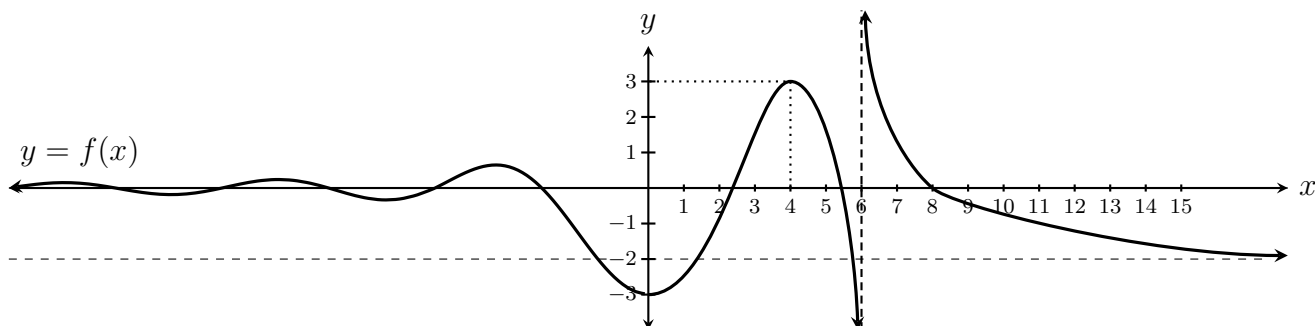


Name: _____

1. (8 points) Answer the following questions about the function $y = f(x)$ graphed below.



(a) $\lim_{x \rightarrow 4} \frac{1}{3 + f(x)} =$

(b) $\lim_{x \rightarrow 8} \frac{1}{(f(x))^2} =$

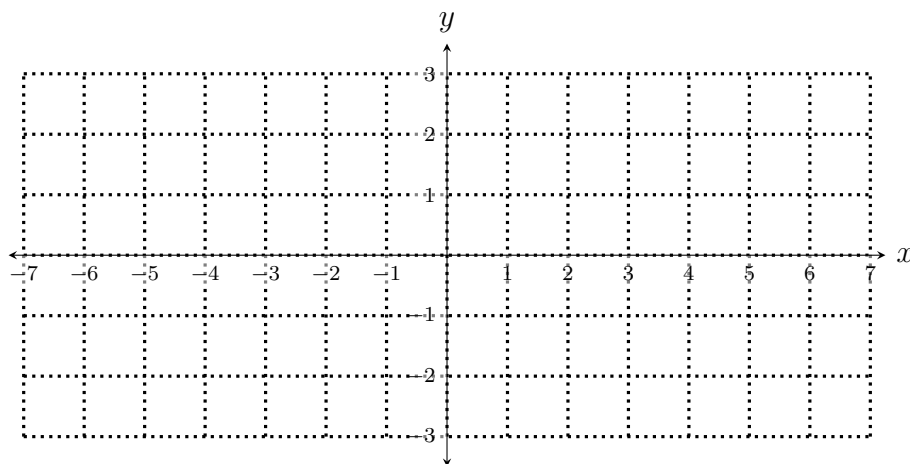
(c) $\lim_{x \rightarrow \infty} f(x) =$

(d) $\lim_{x \rightarrow \infty} \sin\left(\frac{\pi}{f(x)}\right) =$

(e) $\lim_{x \rightarrow 6} \frac{1}{f(x)} =$

2. Draw the graph of a function f that is continuous on $(-\infty, 0) \cup (0, 3) \cup (3, \infty)$ and meets the following conditions.

- $\lim_{x \rightarrow 0} f(x) = \infty$
- $\lim_{x \rightarrow -2} f(x) = -1$
- $\lim_{x \rightarrow \infty} f(x) = 0$
- $\lim_{x \rightarrow 3^-} f(x) = 1$
- $\lim_{x \rightarrow 3^+} f(x) = -2$



3. State the interval(s) on which the function $f(x) = \frac{1}{\sqrt{4 - x^2}}$ is continuous.

$$4. \quad \lim_{x \rightarrow 1} \frac{\frac{4}{x} - 4}{1 - x} =$$

$$5. \quad \lim_{x \rightarrow 2} \frac{x^2 - 2x}{x^2 - 5x + 6} =$$

$$6. \quad \lim_{x \rightarrow \infty} \tan^{-1} \left(\frac{x^2 - 2x}{x^2 - 5x + 6} \right) =$$

$$7. \quad \lim_{x \rightarrow 3^-} \frac{x^2 - 2x}{x^2 - 5x + 6} =$$

8. $\lim_{x \rightarrow 0} \frac{\sin(x) + x \cos(x)}{x} =$
9. Give an example of a function (defined by an algebraic expression) that has a horizontal asymptote of $y = -5$ and two vertical asymptotes, $x = 3$ and $x = 0$.
10. Use a limit definition of the derivative to find the derivative of $f(x) = \sqrt{2x}$.