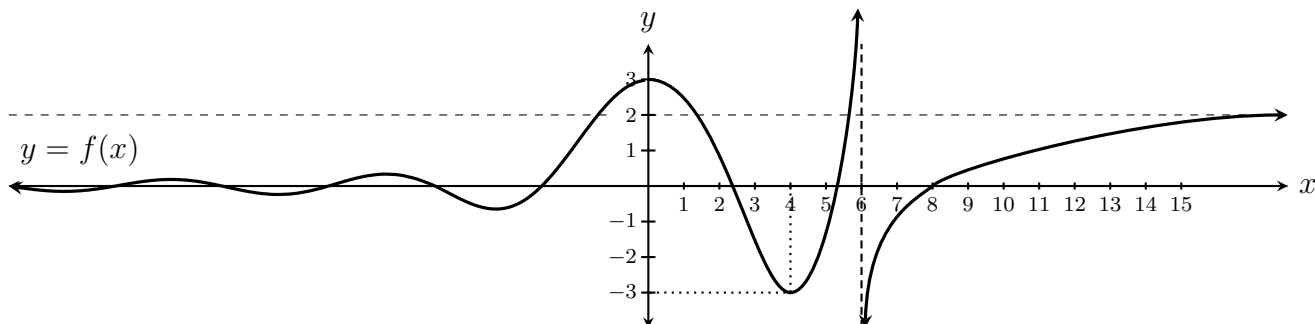


Name: \_\_\_\_\_

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



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

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

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

(d)  $\lim_{x \rightarrow \infty} \cos\left(\frac{6\pi}{f(x)}\right) =$

(e)  $\lim_{x \rightarrow 8^-} \frac{1}{f(x)} =$

2. Draw the graph of a function  $f$  that is continuous on  $(-\infty, -2) \cup (-2, 1) \cup (1, \infty)$  and meets the following conditions.

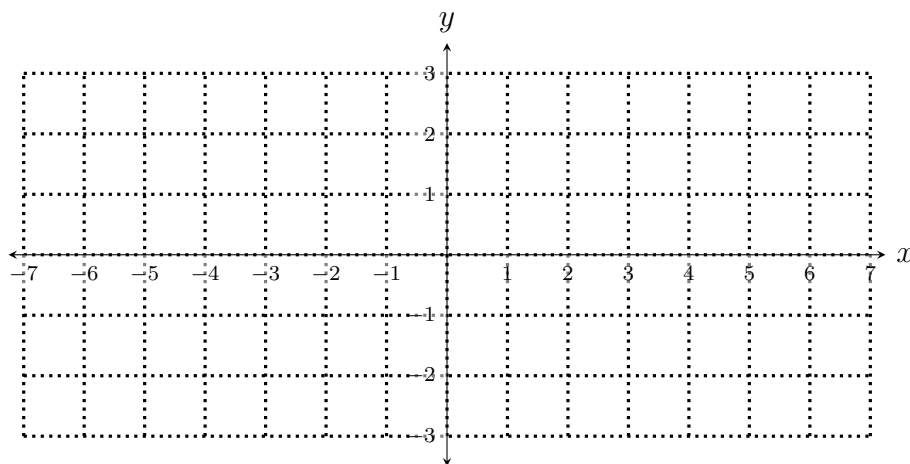
•  $\lim_{x \rightarrow -2} f(x) = \infty$

•  $\lim_{x \rightarrow 3} f(x) = 0$

•  $\lim_{x \rightarrow \infty} f(x) = -1$

•  $\lim_{x \rightarrow 1^-} f(x) = -1$

•  $\lim_{x \rightarrow 1^+} f(x) = \frac{3}{2}$



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

$$4. \quad \lim_{x \rightarrow 1} \frac{2 - \frac{2}{x}}{x - 1} =$$

$$5. \quad \lim_{x \rightarrow 2} \sin^{-1} \left( \frac{x^2 - 3x + 2}{x^2 - 2x} \right) =$$

$$6. \quad \lim_{x \rightarrow 0^+} \frac{x^2 - 3x + 2}{x^2 - 2x} =$$

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

8.  $\lim_{x \rightarrow 1} \frac{\sin(x-1) + x - 1}{x - 1} =$
9. Give an example of a function (defined by an algebraic expression) that has a horizontal asymptote of  $y = 3$  and two vertical asymptotes,  $x = -1$  and  $x = 5$ .
10. Use a limit definition of the derivative to find the derivative of  $f(x) = 2x^2 + 1$ .