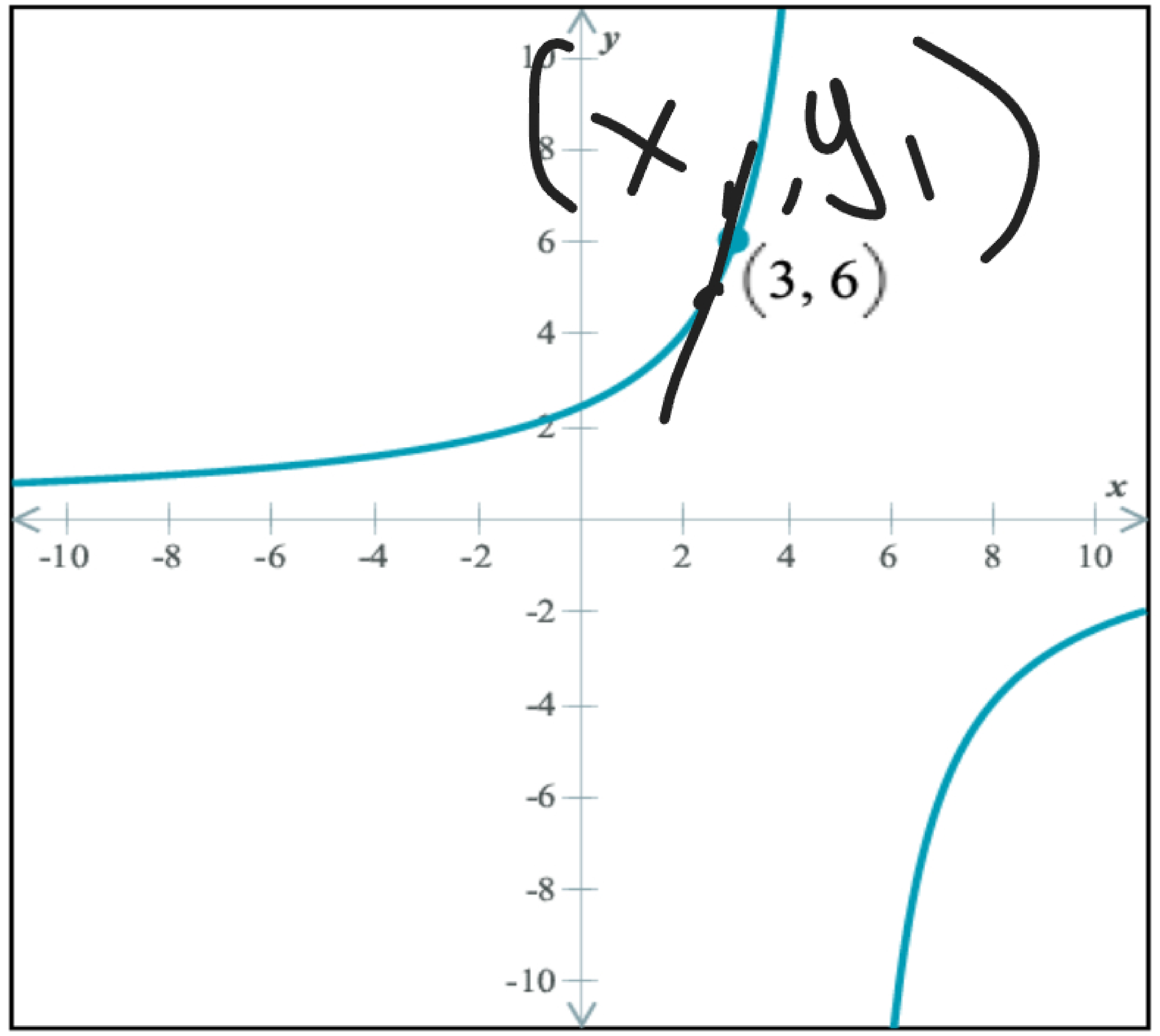
he point $(3, 6)$ is on the graph of the function $f(x) = -\frac{12}{x-5}$ as shown.



$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{-\frac{12}{x-5} - 6}{x - 3}$$

2.8

x	$\frac{-\frac{12}{x-5} - 6}{x-3}$
2.8	2.7272727
2.9	2.8571429
2.99	2.9850746
2.999	2.9985007
3	undefined
3.001	3.0015008
3.01	3.0150754
3.1	3.1578947
3.2	3.3333333

a) For each value of x given in the table below, find the slope of the secant line passing through $(3, 6)$ and $(x, f(x))$. Do not round intermediate computations, and round your answers to 4 decimal places if necessary.

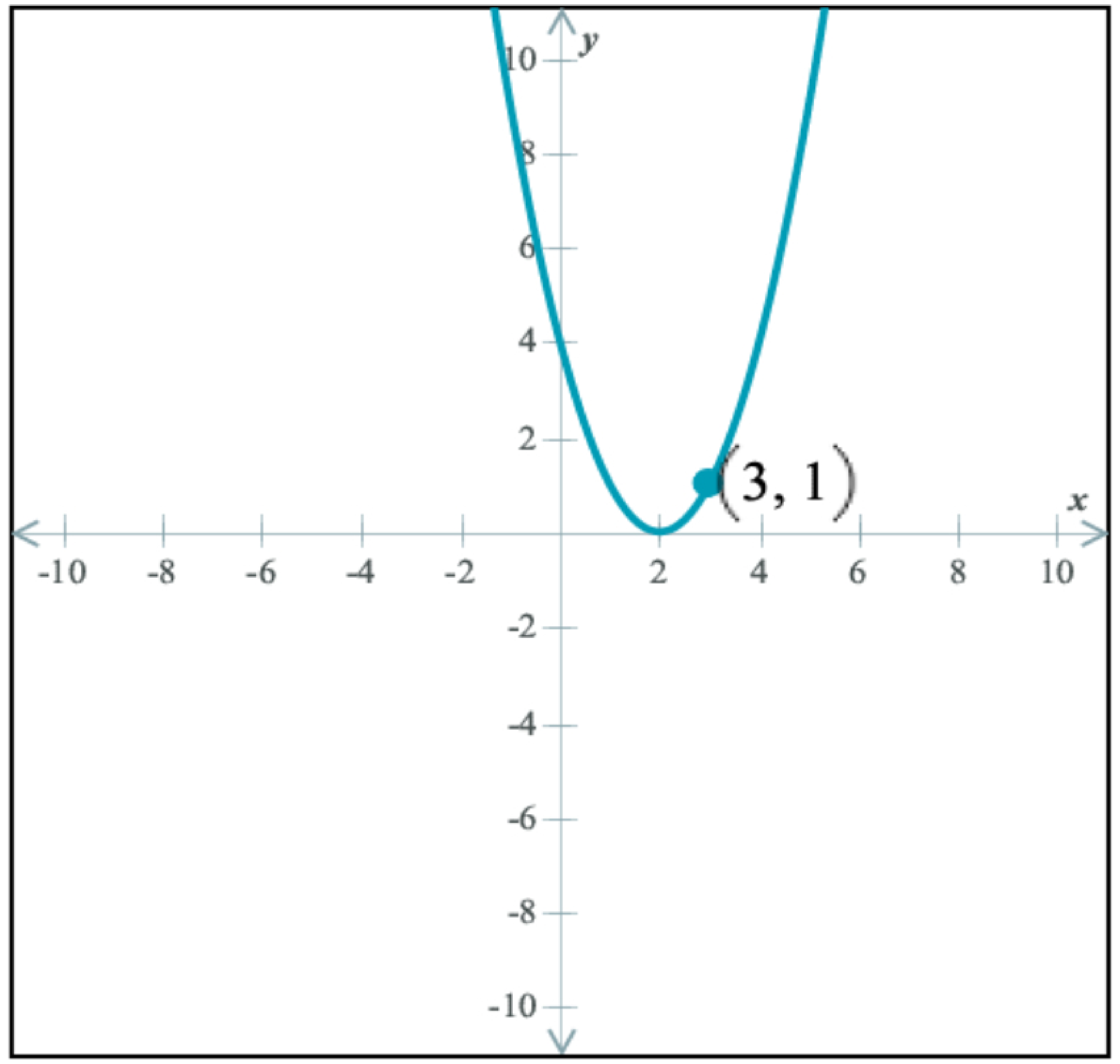
Value of x	2.8	2.9	2.99	2.999	$\rightarrow 3 \leftarrow$	3.001	3.01	3.1	3.2
Slope	______	______	______	______	$\rightarrow ? \leftarrow$	______	______	______	______

Lim $\rightarrow \boxed{3}$

b) Given the graph and the table above, give the apparent slope of the tangent line to the graph of $f(x)$ at $(3, 6)$.

______

The point $(3, 1)$ is on the graph of the function $f(x) = (x-2)^2$ as shown.

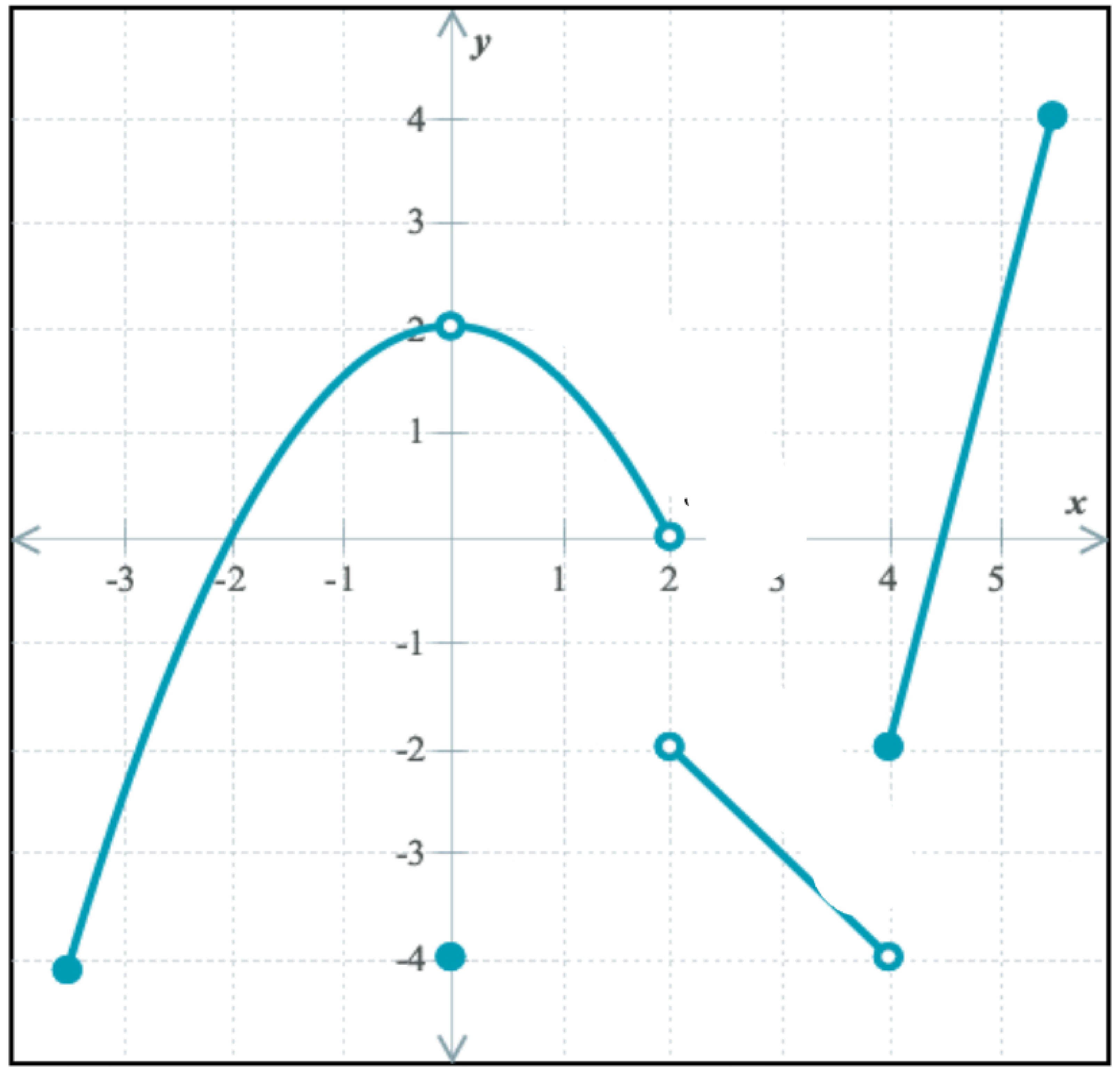


(a) Find the average rate of change of $f(x)$ over each given interval in the table below. Do not round intermediate computations, and round your answers to 4 decimal places if necessary.

Interval	$[2.9, 3]$	$[2.99, 3]$	$[2.999, 3]$	$[3, 3.001]$	$[3, 3.01]$	$[3, 3.1]$
Average rate of change	______	______	______	______	______	______

(b) Given the graph and the table above, give the apparent instantaneous rate of change of $f(x)$ at $x = 3$.

______



Find the following limits. If a limit does not exist, write "Does Not Exist".

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

$\lim_{x \to 2^-} f(x) =$ 0

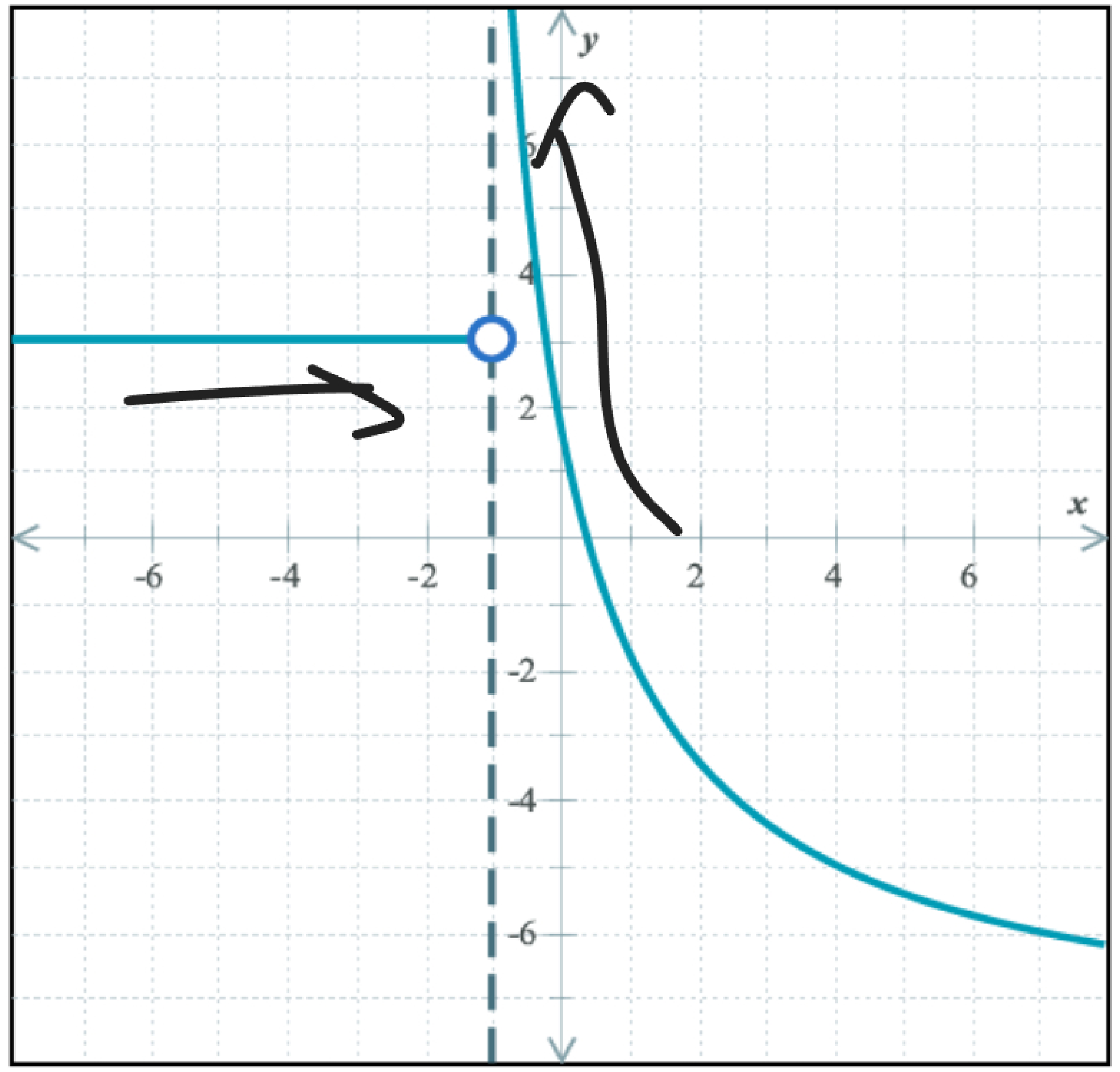
$\lim_{x \to 2} f(x) =$ DNE

$\lim_{x \to 0^+} = 2$

$\lim_{x \to 0^-} = 2$

$\lim_{x \to 0} = 2$

The graph of the function h is shown below, along with its asymptote.



Find the following limits.

If necessary, select the most informative answer from ∞, $-\infty$, and "Does Not Exist".

$\lim_{x \to -1^-} h(x) =$ 3

$\lim_{x \to -1^+} h(x) =$ ∞

$\lim_{x \to -1} h(x) =$ DNE

The function f is defined piecewise as follows.

$$f(x) = \begin{cases} \dfrac{x}{2-x} & \text{if } x < 3 \\ (x-1)^2 - & \text{if } x > 3 \end{cases}$$

Find the following limits.
If a limit does not exist, write "Does Not Exist".

$\lim\limits_{x \to 3^-} f(x) =$ -3

$\lim\limits_{x \to 3^+} f(x) =$ -2

$\lim\limits_{x \to 3} f(x) =$ DNE

$$\frac{3}{2-3} = -3$$

$$(3-1)^2 - 6 = -2$$

Find the following limit.

If the limit does not exist, write "Does Not Exist."

$$\lim_{t \to 4} \frac{t^2 - 16}{t - 4}$$

$$\frac{\cancel{(t-4)}(t+4)}{\cancel{t-4}} = t + 4 \rightarrow 8$$

$$\lim_{x \to 2} \frac{3x^2 - x - 10}{x - 2} = \frac{\ }{2-2} \quad 0$$

$$= 3x + 5 = 11$$

$$\begin{array}{r|rrr} 2 & 3 & -1 & -10 \\ & \downarrow & 6 & 10 \\ \hline & 3 & 5 & 0 \end{array}$$

$3x + 5$

$3x^2 - x - 10$

$3x^2 - 6x + 5x - 10$

$3x(x-2) + 5(x-2) \rightarrow (3x+5)(x-2)$

Find the following limit.
If the limit does not exist, write "Does Not Exist."

$$\lim_{t \to 0} \frac{\frac{3}{2}t - \cos 2t}{\sin\left(\frac{3}{2}t + \frac{\pi}{2}\right) + t} =$$

$$\frac{\frac{3}{2}(0) - \cos(2(0))}{\sin\left(\frac{3}{2}(0) + \frac{\pi}{2}\right) + 0}$$

$$\sin(\pi/2)$$

$$= \frac{0 - 1}{1 + 0} = \frac{-1}{1} = -1$$

Consider the following equation.

$$2-\frac{4}{x}=0$$

Answer the following to determine if we can apply the Intermediate Value Theorem (IVT) to show that the equation has a solution in the interval $(-9, 1)$.

(a) Let $f(x)=2-\frac{4}{x}$. Choose the statement that best describes the continuity of f.

- f is continuous on $[-9, 1]$. That is because f is a polynomial function.
- f is continuous on $[-9, 1]$. That is because f is a rational function, and while there are values of x where f is not defined, those values do not lie in $[-9, 1]$.
- X f is not continuous. That is because f is a rational function that is not defined for at least one value of x in $[-9, 1]$.

$(-9, 1)$

$x \neq 0$

(b) Find $f(-9)$ and $f(1)$. Write each answer as an exact value (not a decimal approximation). Then use $=$ or $\neq$ to compare $f(-9)$ and $f(1)$.

$f(-9) =$ 22/9

$f(1) =$ -2

$f(-9)$ $\neq$ $f(1)$

$$2-\frac{4}{x}=0$$

$$2-\frac{4}{-9}=\frac{22}{9}$$

$$2-\frac{4}{1}=-2$$

Find the following limit.
If the limit does not exist, write "Does Not Exist."

$$\lim_{t \to -\frac{\pi}{2}} \frac{2t - \frac{\pi}{2}}{4\sin 3t} =$$

$$\frac{2\left(-\frac{\pi}{2}\right) - \frac{\pi}{2}}{4\sin\frac{-3\pi}{2}} = \frac{-\frac{3\pi}{2}}{4(1)}$$

$$= \boxed{\frac{-3\pi}{8}}$$

Find the following limit.
If the limit does not exist, write "Does Not Exist."

$$\lim_{x \to -\frac{\pi}{4}} \frac{4x}{1 - \sin 2x + 3\tan x} =$$

$$\frac{4\left(-\frac{\pi}{4}\right)}{1 - \sin\left(2\left(-\frac{\pi}{4}\right)\right) + 3\left(\tan -\frac{\pi}{4}\right)}$$

$$= \frac{-\pi}{1 - (-1) + 3(-1)} = \frac{-\pi}{-1} = \pi$$

(a) Find the following limits. Use exact values in your answers (not decimal approximations). If necessary, select the most informative answer from ∞, $-\infty$, and "Does not exist".

$$\lim_{x \to 1^-} f(x) = 1/5$$

$$\lim_{x \to -4^-} f(x) = -\infty$$

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

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

$$f(x) = \frac{x^3 - x^2}{x^2 + 3x - 4}$$

$$f(x) = \frac{x^2 \cancel{(x-1)}}{\cancel{(x-1)}(x+4)} \quad \frac{+}{-} \rightarrow -$$

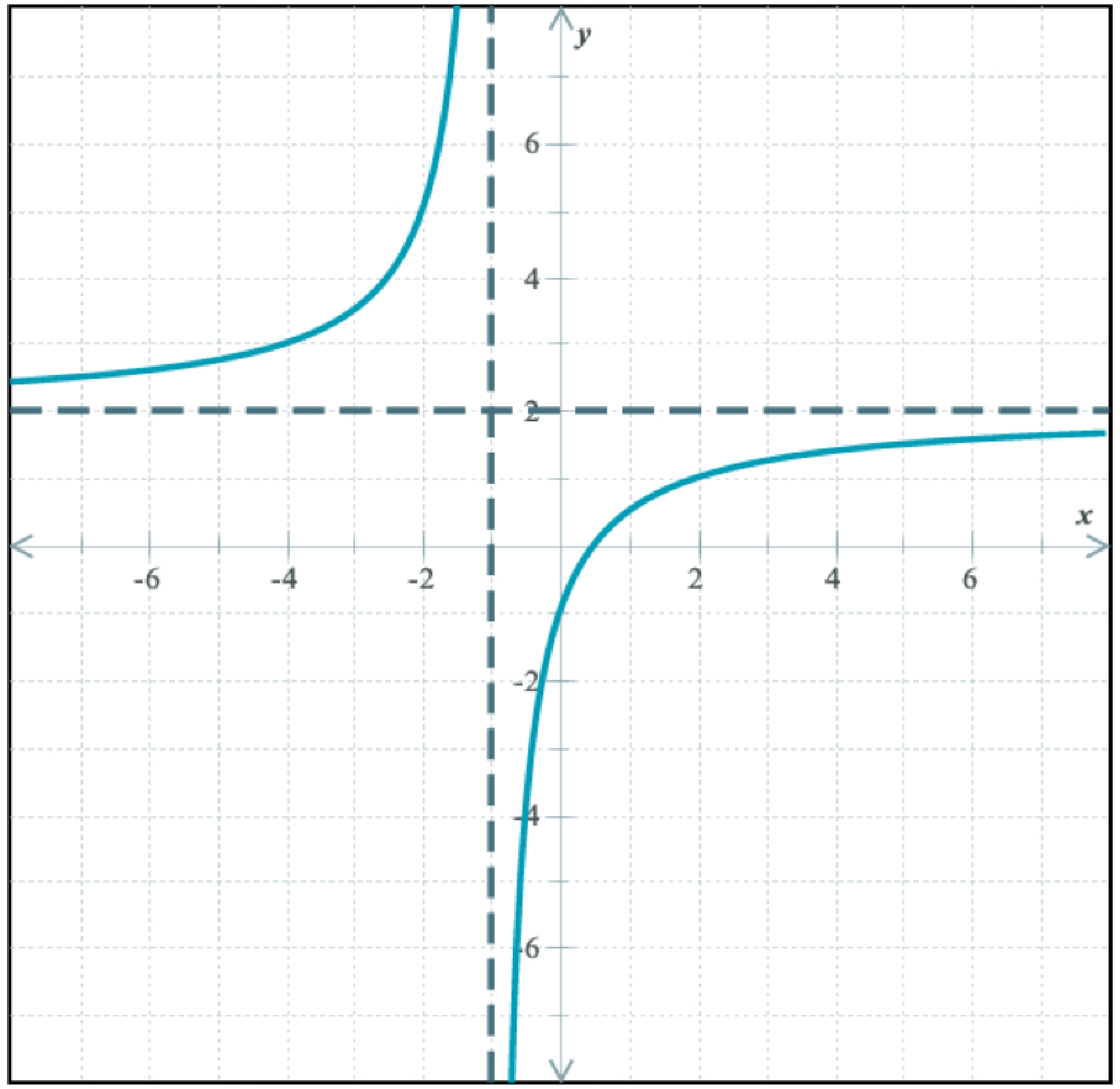
$$f(x) = \frac{x^2}{x+4} \quad \frac{+}{+} \quad x \rightarrow \infty$$

$$\frac{+}{-} \quad x \rightarrow -\infty$$

(b) Write the equation of each horizontal asymptote and the equation of each vertical asymptote of f. Use exact values in your answers (not decimal approximations).

If there is more than one equation, use the word "and" to separate them (example: $x=-11$ and $x=12$). Write "None" if applicable.

The graph of $h(x) = \dfrac{2x-1}{x+1}$ is shown below, along with its asymptotes.



$\lim_{x \to \infty} = 2$

$\lim_{x \to -\infty} = 2$

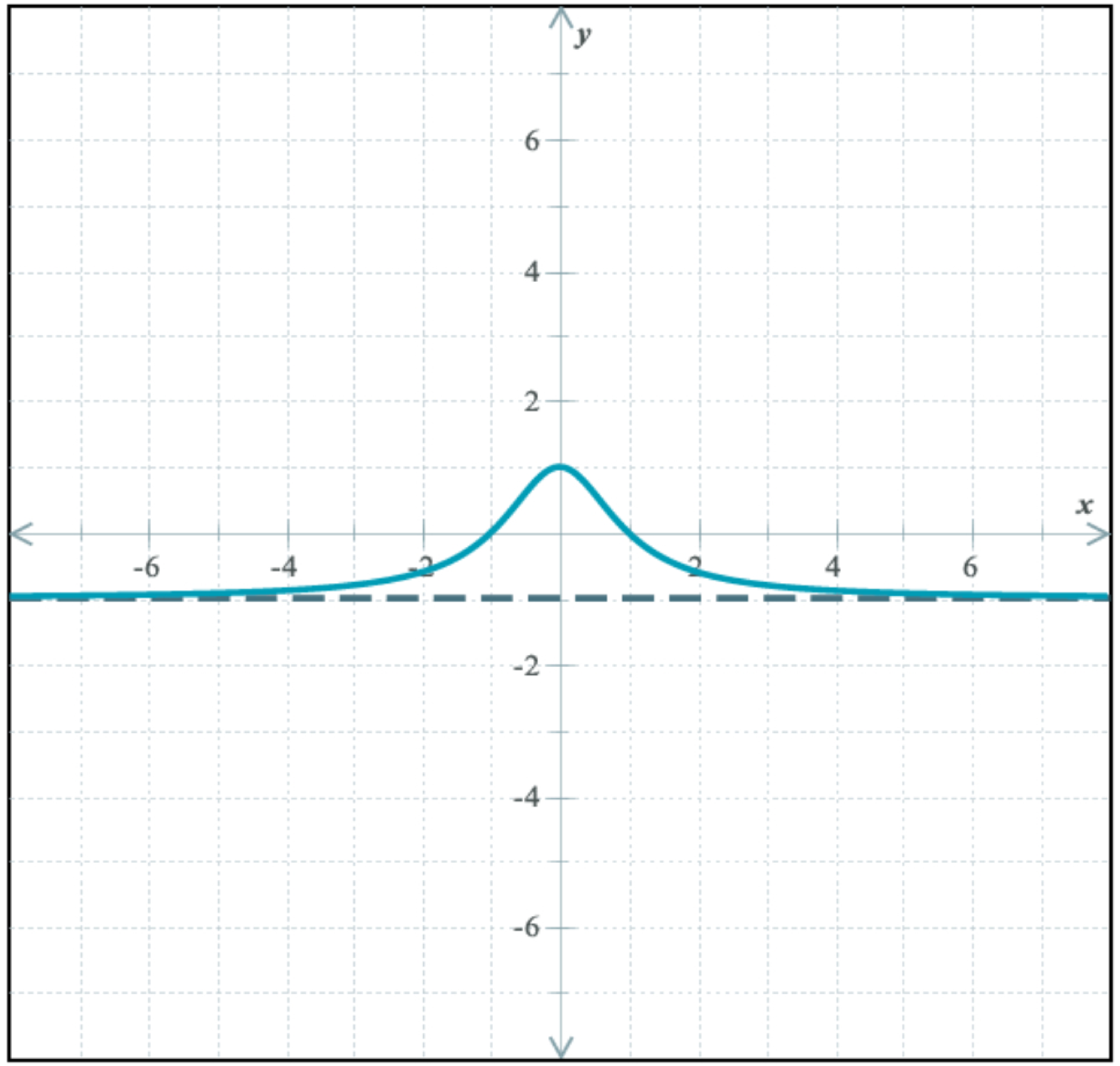
Use the graph to find the following limits.

If necessary, choose the most informative answer from ∞, $-\infty$, and "Does Not Exist".

$$\lim_{x \longrightarrow \infty} h(x) =$$

$$\lim_{x \longrightarrow -\infty} h(x) =$$

The graph of $g(x) = \dfrac{1-x^2}{x^2+1}$ is shown below, along with its asymptote.



Use the graph to find the following limits.

If necessary, choose the most informative answer from ∞, $-\infty$, and "Does Not Exist".

$$\lim_{x \to \infty} g(x) =$$

$$\lim_{x \to -\infty} g(x) =$$

Find the following limits.
If necessary, select the most informative answer from ∞, −∞, and "Does Not Exist."

(a) $\lim_{x \to \infty} \dfrac{5x^2 - 2}{-7 - 2x} =$

$$\frac{\frac{5x^2 - 2}{x}}{\frac{-7 - 2x}{x}} \quad \frac{5x - 2/x}{-7/x - 2} = \frac{5x}{-2} \to -\infty$$

(b) $\lim_{x \to -\infty} \dfrac{2x - 5}{5 - 7x^2} =$

$$\frac{\frac{2x - 5}{x^2}}{\frac{5 - 7x^2}{x^2}} = \frac{\frac{2}{x} - \frac{5}{x^2}}{\frac{5}{x^2} - 7} = \frac{0}{-7} \to 0$$