The point (5, 1) lies on the curve $y = \frac{2}{7-x}$.

Find the tangent Line at (5, 1)

	X	y	$m = \frac{y_2 - y_1}{x_2 - x_1}$
*	4.9	20/21	10/21
	4,99	200/201	100/201
	4,999	2000/2001	1000/2001
	5	1	Undefined
	5.001	2000/1999	1000/1999
	5,01	200/199	100/199
	5,1	20/19	10/19

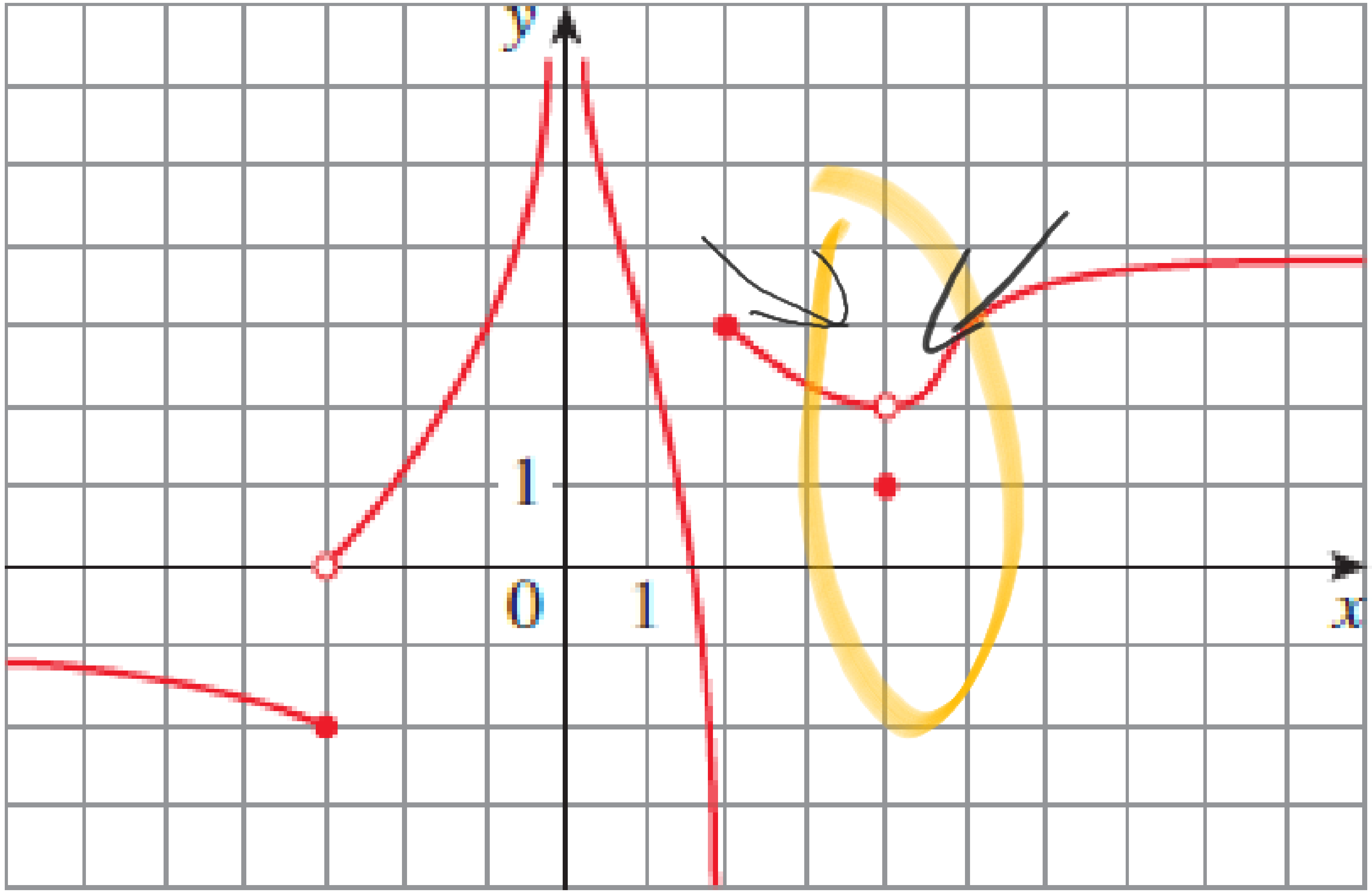
The point (5, 1) lies on the curve $y = \frac{2}{7-x}$.

Find the tangent Line at (5, 1)

Slope $\rightarrow \frac{1}{2} = m$

$y = mx + b \rightarrow \boxed{y = \frac{1}{2}x - \frac{3}{2}}$

$1 = \frac{1}{2}(5) + b \rightarrow b = \frac{3}{2}$

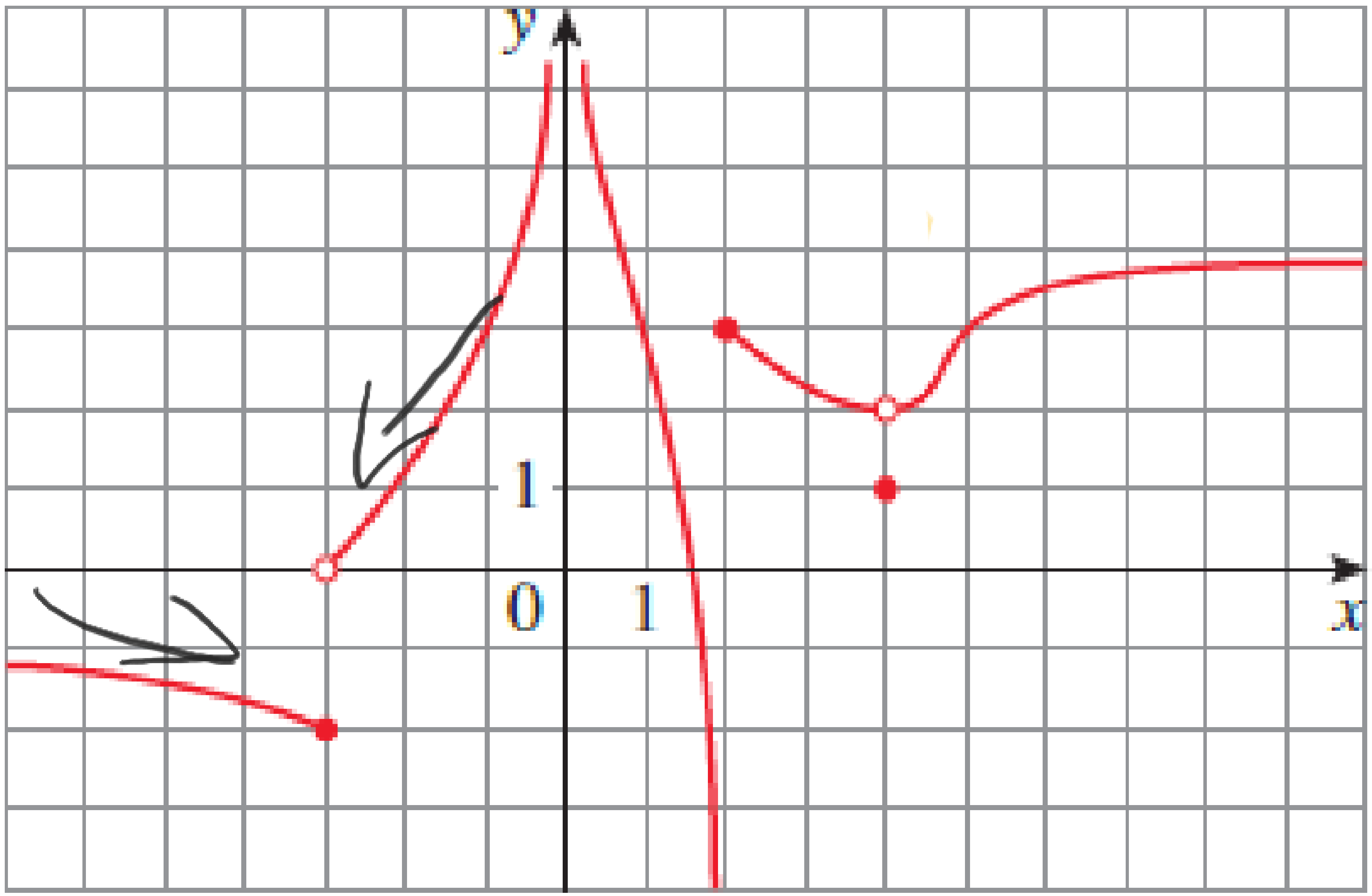


$$\lim_{x \to 4^-} f(x) = 2$$

$$\lim_{x \to 4^+} f(x) = 2$$

$$\lim_{x \to 4} f(x) = 2$$

$$f(4) = 1$$



$\lim_{x \to -3^-} f(x) = -2$

$\lim_{x \to -3^+} f(x) = 0$

$\lim_{x \to -3} f(x) = \text{DIVE}$

$f(-3) = -2$

Find $\lim_{x\to 0} \sin(x^3 + 3x)$ $\rightarrow$ $\sin(0) = 0$

$$\lim_{x\to 2} \frac{2-x}{\sqrt{x+2}-2} \quad \frac{(\sqrt{x+2}+2)}{(\sqrt{x+2}+2)}$$

$$\lim_{x\to 2} \frac{\boxed{(2-x)}(\sqrt{x+2}+2)}{(x+2)-4} \to \boxed{x-2} = -(2-x)$$

$$\lim_{x\to 2} \frac{\cancel{(2-x)}(\sqrt{x+2}+2)}{-\cancel{(2-x)}} = \lim_{x\to 2} -(\sqrt{x+2}+2)$$

$$\to \boxed{-4}$$

Let

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

(a) Evaluate each of the following, if it exists.

(i) $\lim_{x \to 1^-} g(x)$ (ii) $\lim_{x \to 1} g(x) = 1$ (iii) $g(1) = 3$

$= 1$

$x \to 1^- = 1$

$x \to 1^+ = 1$

Let

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

(a) Evaluate each of the following, if it exists.

(iv) $\lim_{x \to 2^-} g(x) = -2$ (v) $\lim_{x \to 2^+} g(x) = -1$ (vi) $\lim_{x \to 2} g(x)$

DNE

$$\lim_{t\to-\infty} \frac{6t^2+t-5}{9-2t^2} = \frac{6t^2}{-2t^2} = \frac{6}{-2} = -3$$

t^2

$$\lim_{t\to-\infty} \frac{6+1/t-5/t^2}{9/t^2-2} = \frac{6}{-2} = -3$$

$$\lim_{x \to \infty} \frac{\sqrt{2x^2 + 1}}{3x - 5} \Big/ x$$

$$\frac{\sqrt{2x^2+1}}{x} = \sqrt{\frac{2x^2+1}{x^2}}$$

$$\sqrt{x^2} = x$$

$$\lim_{x \to \infty} \frac{\sqrt{2 + 1/x^2}}{3 - 5/x} = \boxed{\frac{\sqrt{2}}{3}}$$

$$\lim_{x \to \infty} \frac{1}{x^a} = 0$$

$$\lim_{x\to-\infty}\left(x^2+2x^7\right)$$

$\cancel{\infty - \infty = 0}$

$$\lim_{x\to-\infty}\left(x^2\right)\left(1+2x^5\right)$$

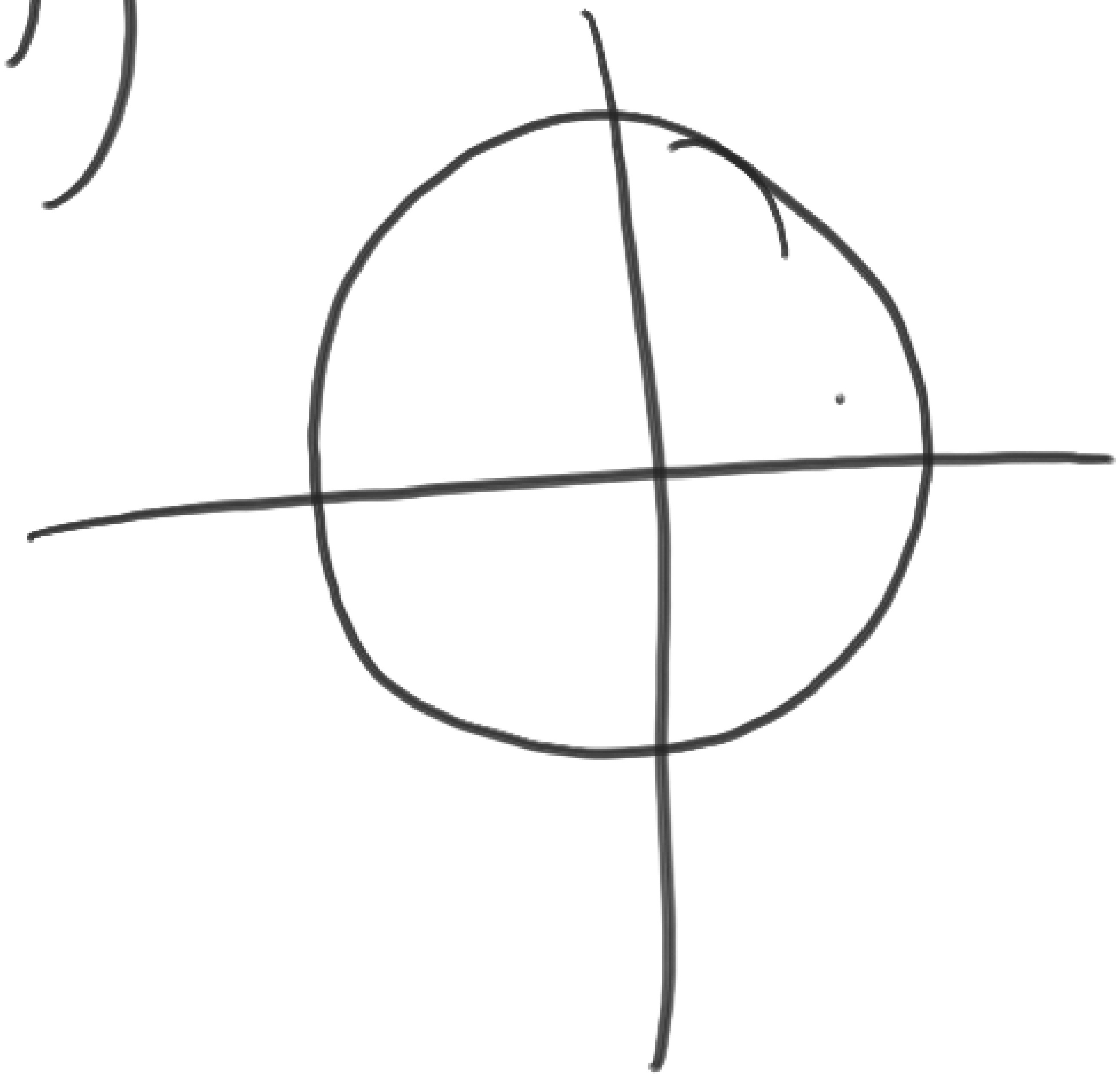
$$(\infty)(-\infty) = \boxed{-\infty}$$

Find $\lim\limits_{x \to 0^+} \cot^{-1}(\ln(x))$

$$\cot^{-1}\left(\lim_{x \to 0^+}(\ln(x))\right)$$

$$\cot^{-1}(-\infty)$$

$$\pi$$



Find $\lim_{x\to\infty} \frac{1}{x\sec(x)}$ $\Rightarrow \lim_{x\to\infty} \frac{\cos(x)}{x}$

$\boxed{0}$

$$-1 \le \cos(x) \le 1$$

$$\lim_{x\to\infty}\left(\frac{-1}{x} \le \frac{\cos(x)}{x} \le \frac{1}{x}\right)$$

$$\boxed{0 \le \lim_{x\to\infty} \frac{\cos(x)}{x} \le 0}$$

For $-\frac{1}{2} < x < \frac{1}{2}$, we have $2x - 1 < 0$ and $2x + 1 > 0$, so $|2x - 1| = -(2x - 1)$ and $|2x + 1| = 2x + 1$.

Therefore, $\lim\limits_{x \to 0} \dfrac{|2x - 1| - |2x + 1|}{x} = \lim\limits_{x \to 0} \dfrac{-(2x - 1) - (2x + 1)}{x} = \lim\limits_{x \to 0} \dfrac{-4x}{x} = \lim\limits_{x \to 0} (-4) = -4.$

$|2x - 1| \to -(2x - 1)$

$|2x + 1| \to (2x + 1)$

$$\lim_{x \to 0} \frac{-(2x - 1) - (2x + 1)}{x} = \frac{-4\cancel{x}}{\cancel{x}}$$

$$\frac{|5x-4| - |5x+4|}{x}$$

$$-\frac{4}{5} \le x \le \frac{4}{5}$$

$$\frac{-(5x-4)-(5x+4)}{x}$$

$$\frac{-10x}{x} = -10$$

$$\frac{|3x+2| - |5x-1|}{x}$$