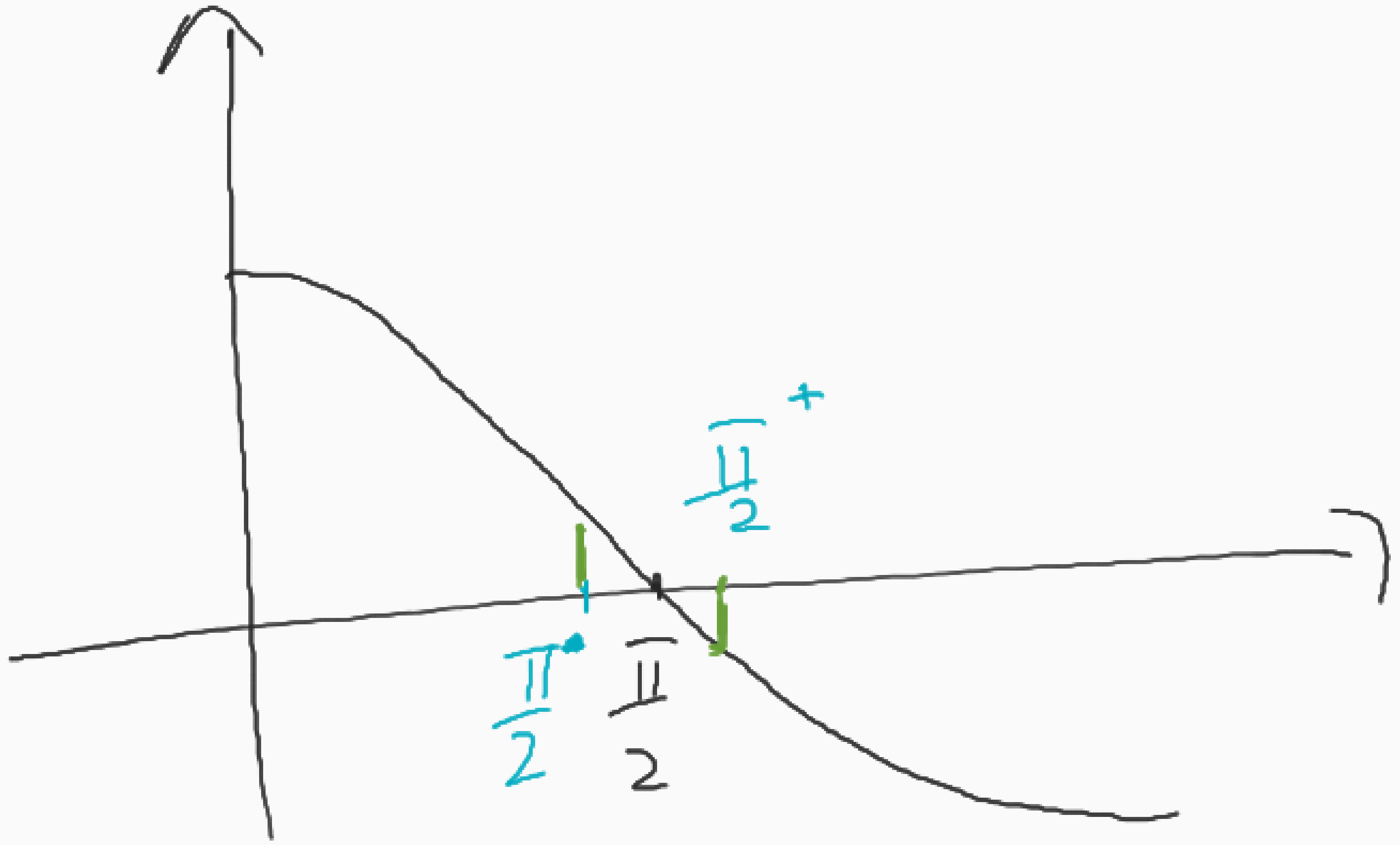


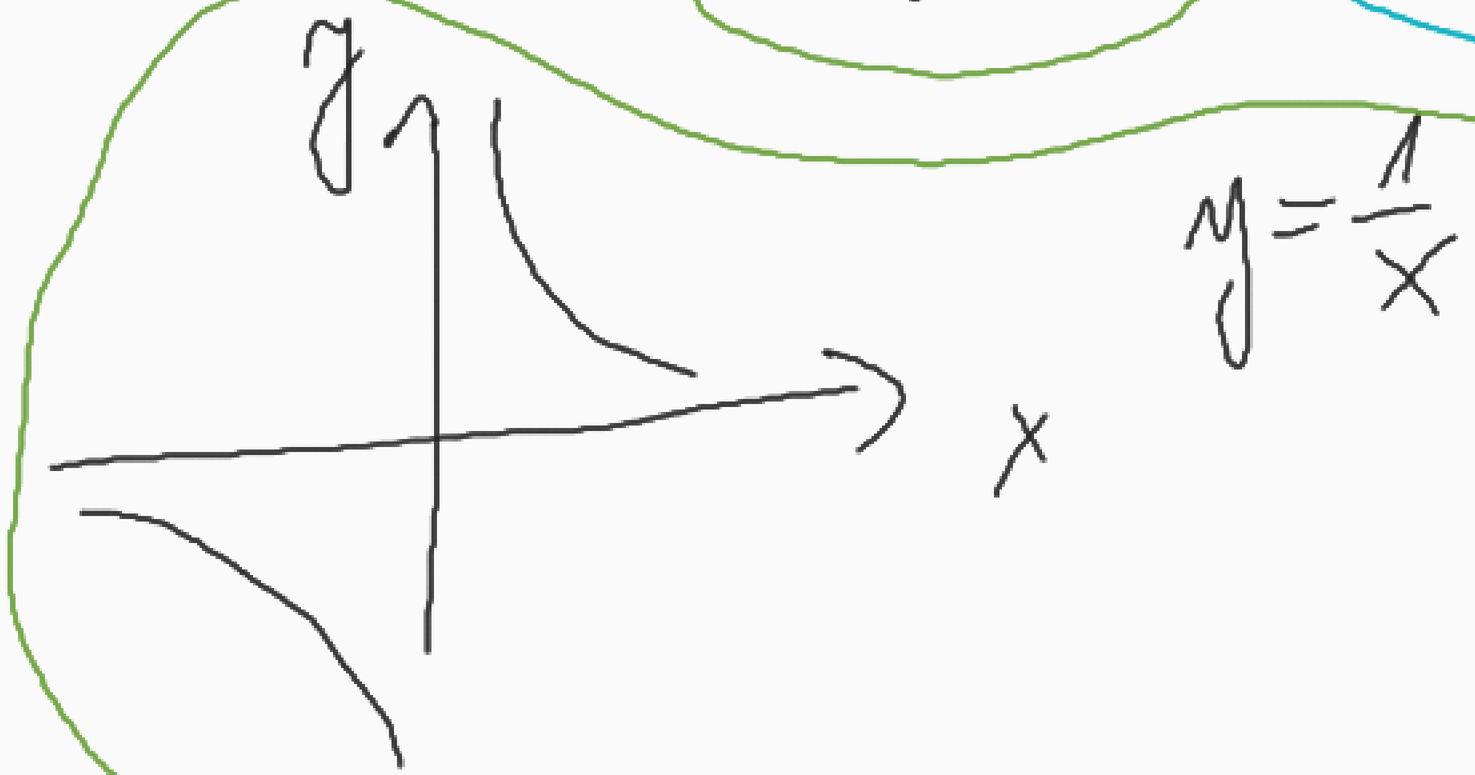
$\frac{\pi}{2}^{+}$
$\frac{\pi}{2}^{-}$
$\frac{\pi}{2}$

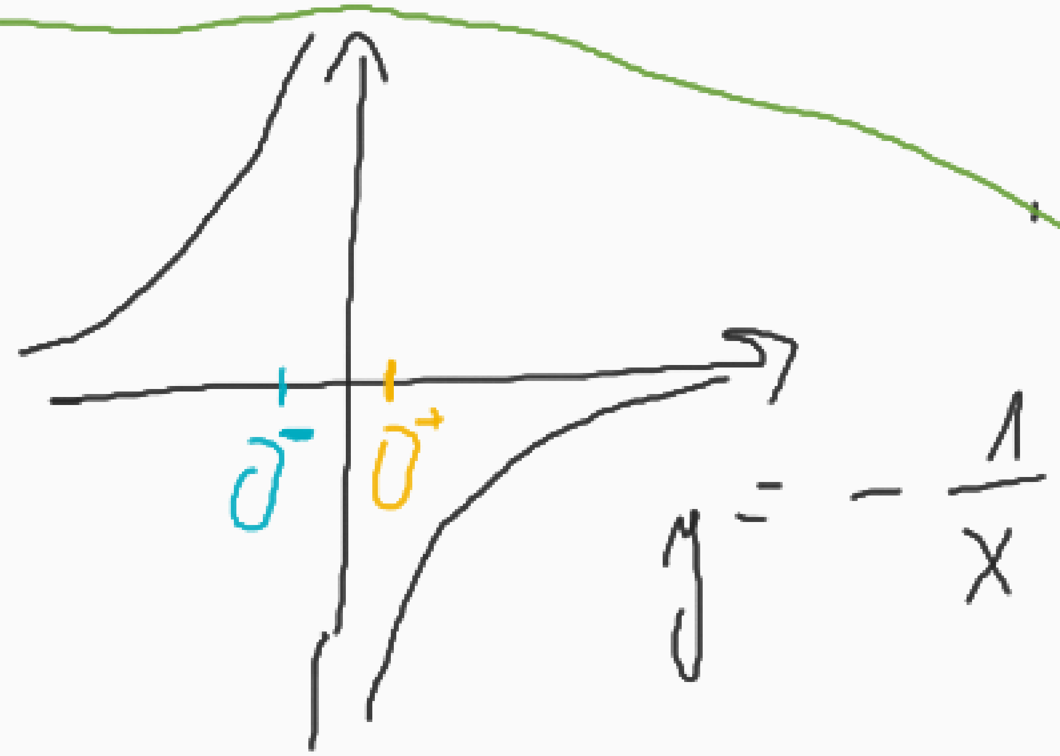
a) $f(x) = \dfrac{2x^2 - 5x - 1}{2 - x}$ $D(f) = \mathbb{R} - \{2\}$

ABS

$$\lim_{x \to 2^+} \frac{2x^2 - 5x - 1}{2 - x} = \frac{-3}{0^-} = \boxed{+\infty}$$

$f(x)$





$$\lim_{x \to 2^-} \frac{2x^2 - 5x - 1}{2 - x} = \frac{-3}{0^+} = -\infty$$

-3

0^+

$\boxed{ASS}$ $y = kx + q$

$y_1 = k_1 x + q_1$ $\quad k_1 = \lim_{x \to \infty} \frac{f(x)}{x} = \lim_{x \to \infty} \frac{2x^2 - 5x - 1}{2x - x^2}$

$= -2$

$$q_1 = \lim_{x \to \infty} \left(f(x) - k_1 x \right) =$$

DOP. k_2

q_2

$x \to -\infty$

$$= \lim_{x \to \infty} \left(\frac{2x^2 - 5x - 1}{2 - x} \overset{k_1}{+2} x \right) =$$

$$= \lim_{x \to \infty} \frac{\cancel{2x^2} - 5x - 1 + 4x - \cancel{2x^2}}{2 - x} =$$

$$= \lim_{x \to \infty} \frac{-x + 1}{2 - x} = 1$$

$$y = k_1 x + q_1$$

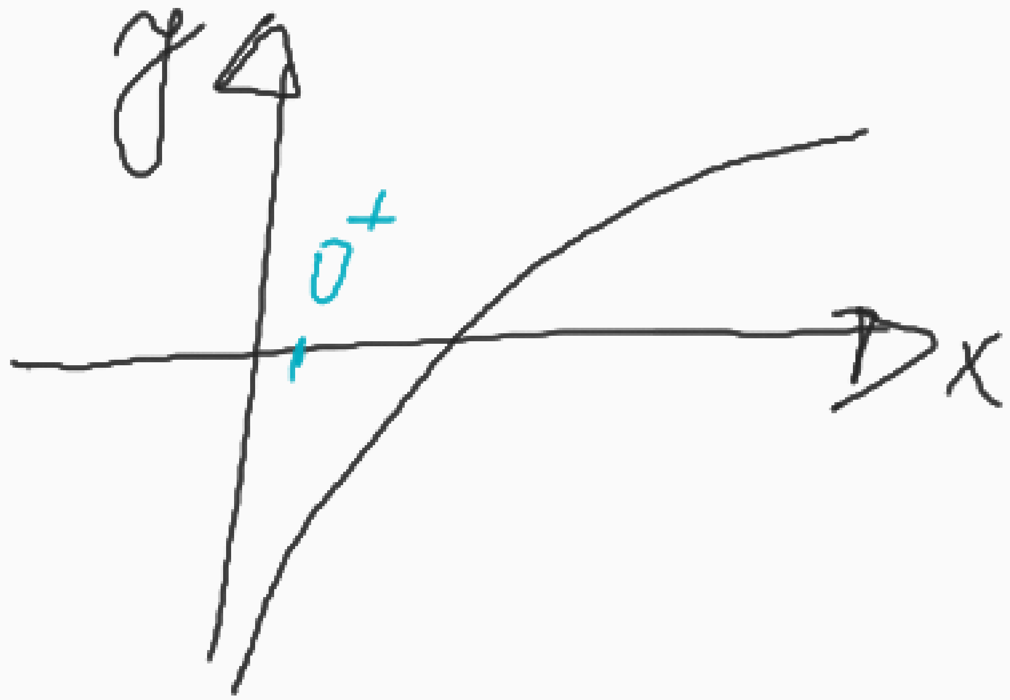
$$y = -2x + 1$$

(b) $f(x) = \ln x$ $\qquad D(f): (0, \infty)$

$\boxed{\text{ABS}}$

$$\lim_{x \to 0^+} \ln x = -\infty$$

$$\boxed{x = 0}$$

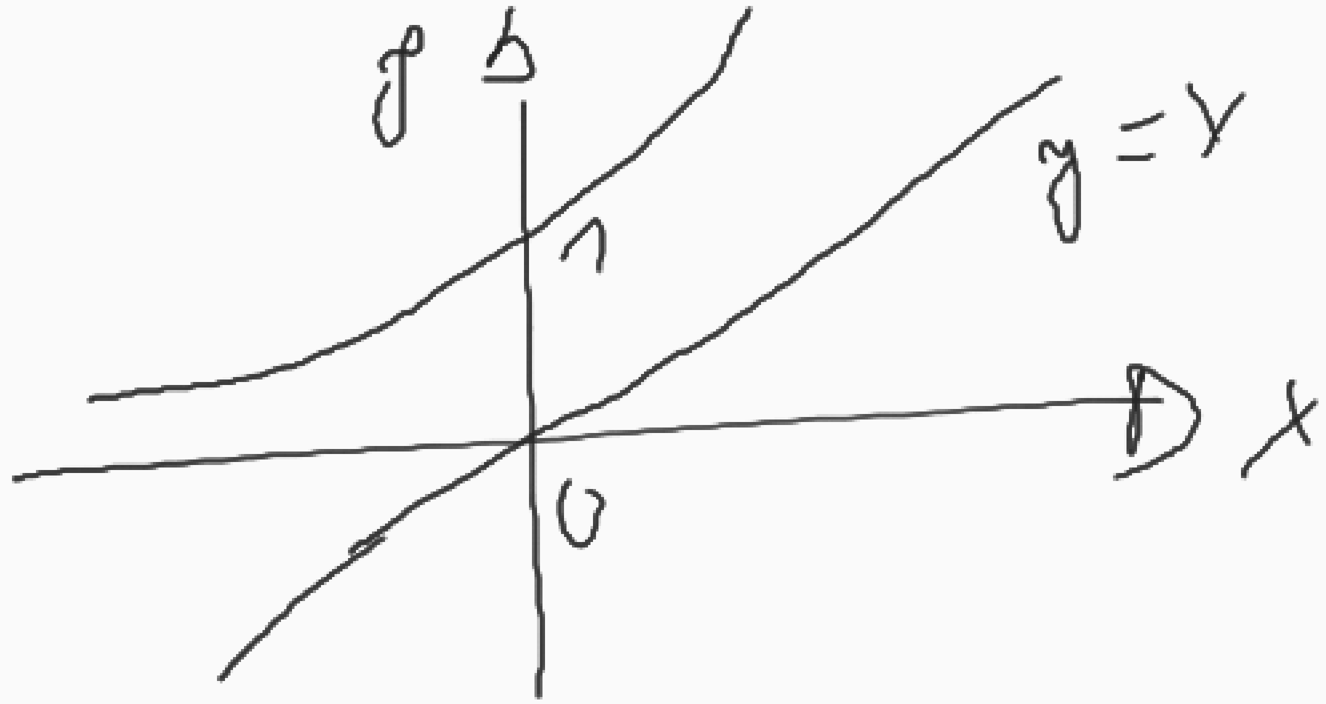


$\boxed{\text{ASS}}$

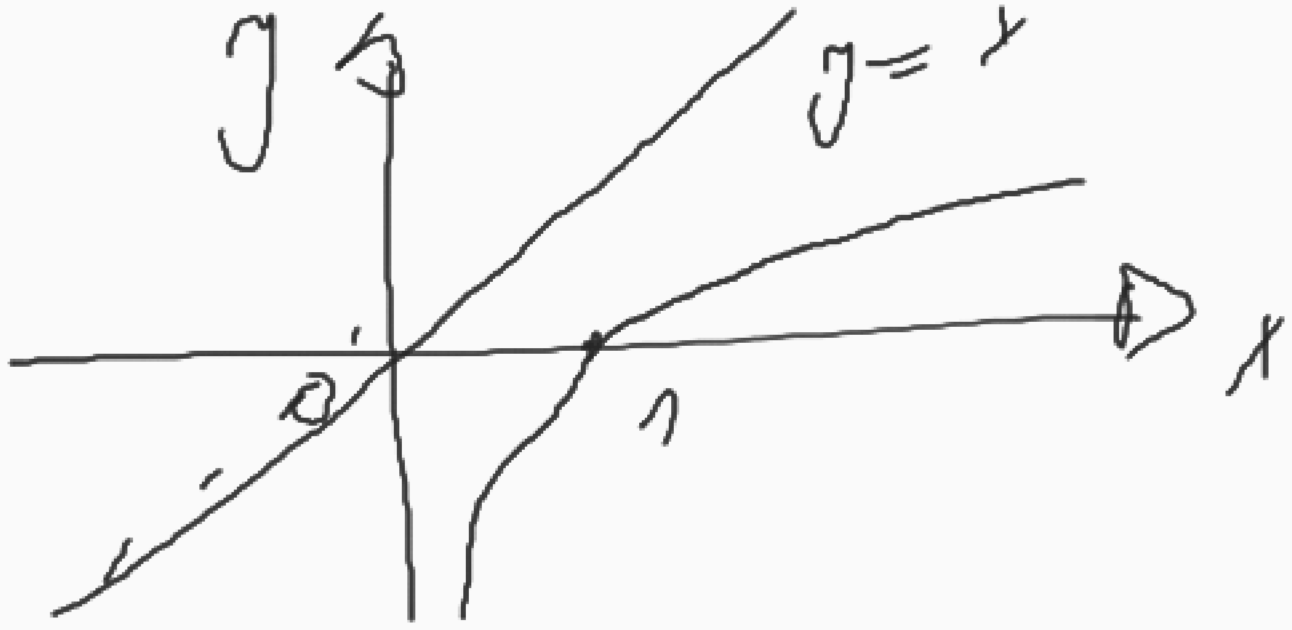
$$\boxed{y = kx + q}$$

$$k = \lim_{x \to \infty} \frac{f(x)}{x} = \lim_{x \to \infty} \frac{\ln x}{x} = 0$$

$$\lim_{x \to \infty} \frac{e^{x}}{x} = \infty$$



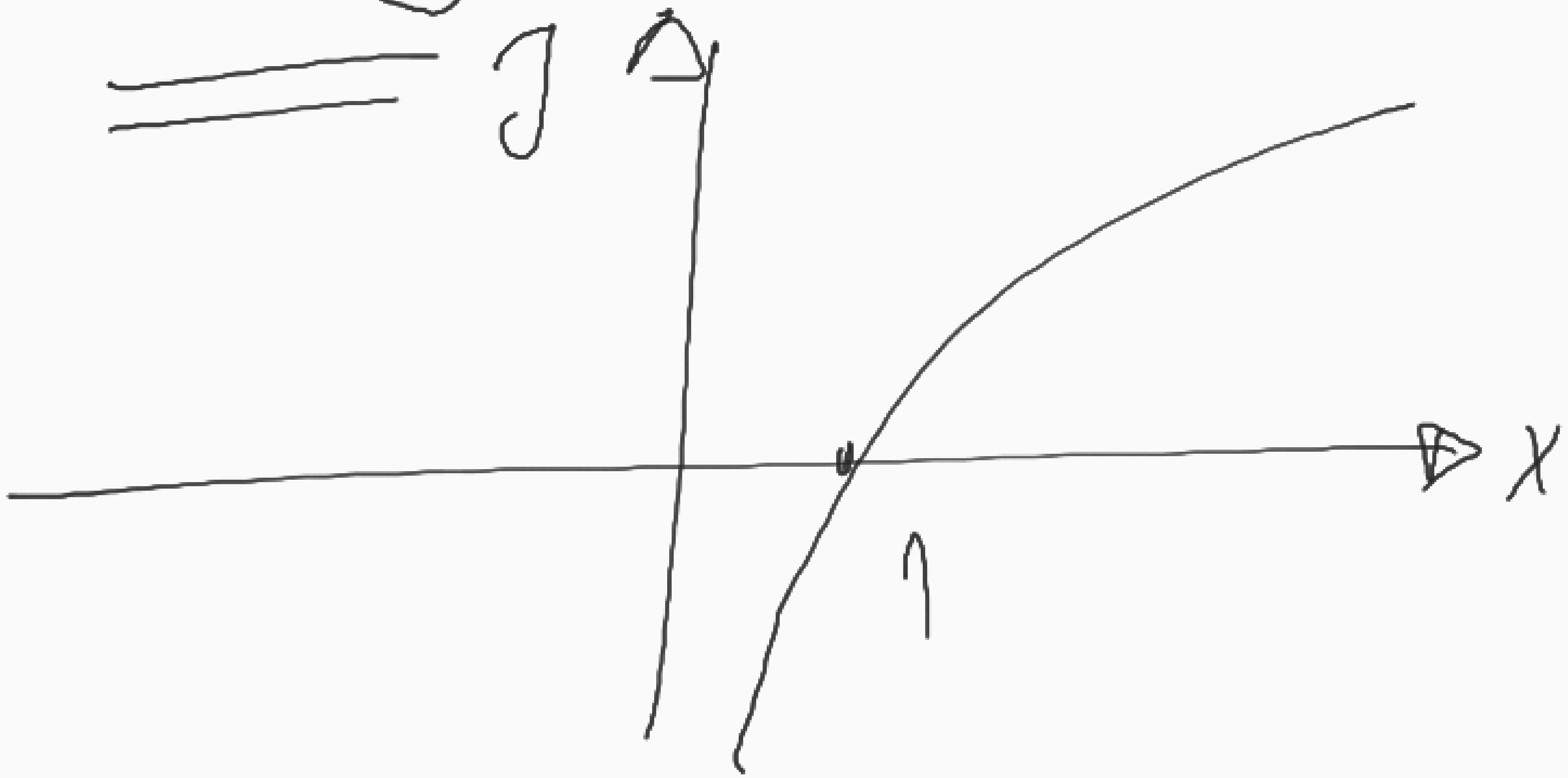
$$\lim_{x \to \infty} \frac{\ln x}{x} = 0$$



$$q = \lim_{x \to \infty} \left(f(x) - kx \right) = \lim_{x \to \infty} \left(\ln x - 0 \right)$$

$$= \lim_{x \to \infty} \ln x = \underline{\underline{\infty}}$$

$\boxed{\text{ASS}}$ $\nexists$



c) $y = x \cdot 2^x$ $\qquad D(f): \mathbb{R}$

$\boxed{ABS}$ $\nexists$

$\boxed{ASS}$ $y = kx + q$

$k_1 = \lim\limits_{\boxed{x \to \infty}} \frac{f(x)}{x} = \lim\limits_{x \to \infty} \frac{\cancel{x} \cdot 2^x}{\cancel{x}} = \infty \quad \nexists$

$q_1 = \nexists$

$$k_2 = \lim_{x \to -\infty} \frac{f(x)}{x} = \lim_{x \to -\infty} \frac{\cancel{x}\, 2^x}{\cancel{x}} =$$

$$= \lim_{x \to -\infty} 2^x = \lim_{x \to \infty} \frac{1}{2^x} = \underline{\underline{0}}$$

$$q_2 = \lim_{x \to -\infty} \left(f(x) - k_2 x \right) = \lim_{x \to -\infty} x \cdot 2^x =$$

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

ASS $\boxed{y = 0}$

4 $a = 2$

$$f(x) = \frac{2x^2+6x-20}{x^3-3x^2+2x}$$

$x \neq 2$, $x = 0$,
$x \neq 1$

$$f(x) = 7 \qquad x = 2$$

$$\lim_{x \to 2} \frac{2x^2+6x-20}{x^3-3x^2+2x} = \lim_{x \to 2} \frac{2(x^2+3x-10)}{x(x^2-3x+2)} =$$

$$= \lim_{x \to 2} \frac{2(x+5)\cancel{(x-2)}}{x\cancel{(x-2)}(x-1)} = \frac{\cancel{2}(2+5)}{\cancel{2}(2-1)} = \underline{\underline{7}}$$

Άιω

b) $a=4$ $\qquad f(x)=\dfrac{2x-8}{\sqrt{x-1}-\sqrt{3}}$ $\qquad x\neq 4$

$f(x)=2$ $\qquad x=4$

$\boxed{NIE}$

$$\lim_{x\to 4}\frac{2(x-4)}{\sqrt{x-1}-\sqrt{3}}\cdot\frac{\sqrt{x-1}+\sqrt{3}}{\sqrt{x-1}+\sqrt{3}}=$$

$$=\lim_{x\to 4}\frac{2\cancel{(x-4)}\cdot\left(\sqrt{x-1}+\sqrt{3}\right)}{\cancel{\underbrace{x-1-3}_{x-4}}}=2\cdot\left(\sqrt{3}+\sqrt{3}\right)=4\sqrt{3}$$

(c) $a = \pi$

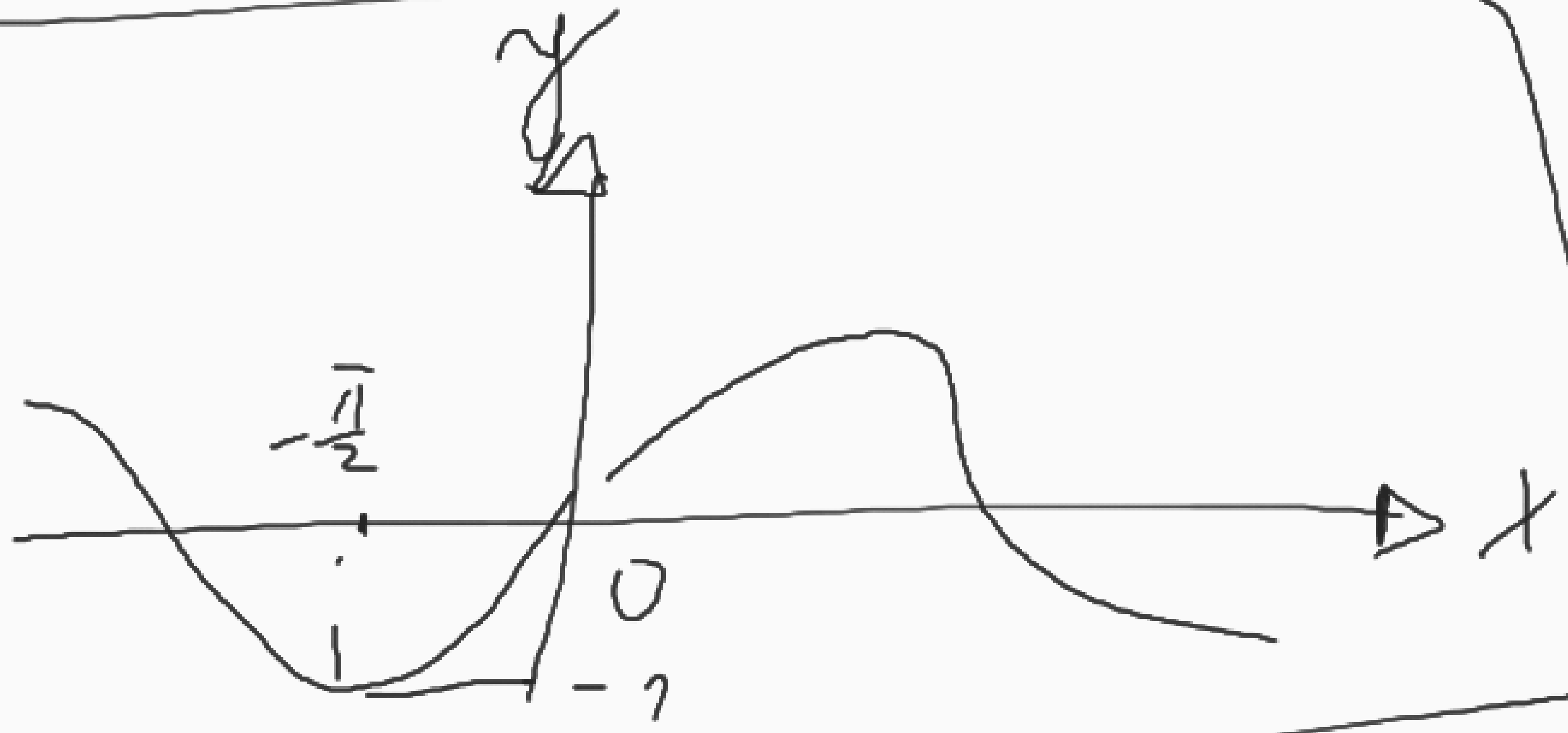
$$f(x) = \frac{(2x)^2 - 4\pi x}{\pi - x} \qquad x < \pi$$

$$f(x) = 4x \sin\left(x - \frac{3\pi}{2}\right) \qquad x \geq \pi$$

$$\lim_{x \to \pi^-} \frac{4x^2 - 4\pi x}{\pi - x} = \lim_{x \to \pi^-} \frac{4x\,\cancel{(x - \pi)}}{-\cancel{(-\pi + x)}} =$$

$$= -4\pi$$

$$\lim_{x \to \pi^{+}} 4x \sin\left(x - \frac{3\pi}{2}\right) = 4\pi \sin\underbrace{\left(\frac{2\pi}{2} - \frac{3\pi}{2}\right)}_{-\frac{\pi}{2}} = -1$$



$$= \boxed{-4\pi}$$

ÁNO

a) $a = 0$; $f(x) = \dfrac{\sin(5x)}{2x}$ $\quad x \neq 0$

$f(x) = k$ $\quad x = 0$

$$\lim_{x \to 0} \frac{\sin(5x)}{5 \cdot 2x} \cdot 5 = \lim_{x \to 0} k = k$$

$$\frac{5}{2} \underbrace{\lim_{x \to 0} \frac{\sin 5x}{5x}}_{=1} = k$$

$$\boxed{k = \frac{5}{2}}$$

(b) $a = 0$; $f(x) = \begin{cases} e^{\frac{1}{x}} & x \neq 0 \\ p & x = 0 \end{cases}$

$$\lim_{x \to 0^+} e^{\frac{1}{x}} = e^{\overset{+\infty}{\frac{1}{0^+}}} = \infty$$

$\nexists$

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

(c) $a = 1$

$f(x) = \mu^2 x \quad x < 1$

$f(x) = \mu \cdot tg\frac{\pi x}{4} \quad x \geq 1$

$$\lim_{x \to 1^-} \mu^2 x = \lim_{x \to 1^+} \mu \cdot tg\frac{\pi x}{4}$$

$$\mu^2 = \mu \cdot tg\frac{\pi}{4} \quad 1$$

$$x^2 = x \Rightarrow x^2 - x = 0$$

$$x(x-1) = 0$$

$$\boxed{\begin{array}{l} x = 0 \\ x = 1 \end{array}}$$

(a) $a = 4$

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

$$\frac{1}{\mu} - 1 = 8$$

$$\frac{1}{\mu} = 9 \Rightarrow \boxed{\mu = \frac{1}{9}}$$