№ 53

$$3^{1+x} - 3^{1-x} > 8 \qquad !$$

$$a^{-n} = \frac{1}{a^n}$$

$$3^{1+x} - \frac{1}{3^{x-1}} > 8$$

$$\downarrow$$

$$x + 1 = x - 1 + 2$$

$$3^{x+1} = 3^{x-1+2} = 3^2 \cdot 3^{x-1} =$$

$$= 9 \cdot 3^{x-1}$$

$$9 \cdot 3^{x-1} - \frac{1}{3^{x-1}} > 8$$

$$3^{x-1} = y$$

$$9y - \frac{1}{y} > 8 \cdot y$$

$$\underline{3^{x-1} > 0}$$

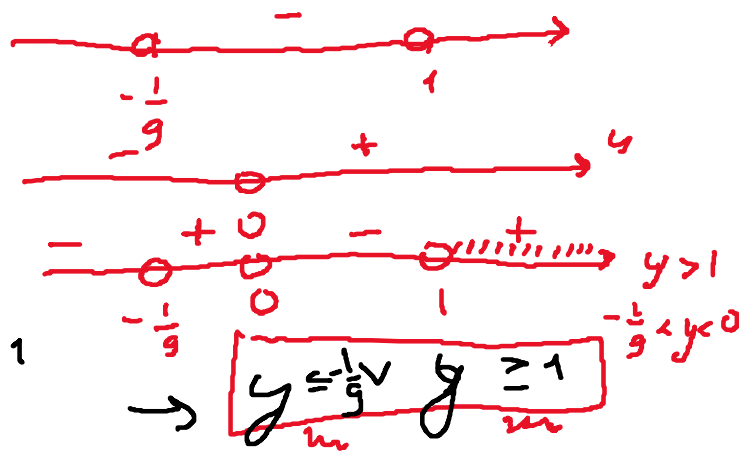$$3 > 2 \mid \cdot (-4)$$

$$-12 > -8$$

$$9y - \frac{1}{y} - 8 > 0$$

$$9y^2 - 1 - 8y$$

$$\frac{9y^2 - 1 - 8y}{y} > 0$$

$$N = 0 \quad 9y^2 - 8y - 1 > 0$$

$$y_{1,2} = \frac{8 \pm \sqrt{64+36}}{18} = \frac{8 \pm 10}{18} \searrow \begin{array}{l} 1 \\ -\frac{1}{9} \end{array}$$

$$y \leq -\frac{1}{9} \lor y \geq 1$$

$$-\frac{1}{9} < y < 0 \lor y > 1$$

$$D > 0 \quad y > 0$$

$$\begin{cases} y > 0 \\ y \leq -\frac{1}{9} \lor y \geq 1 \end{cases}$$

$$-\frac{1}{9} < y < 0 \lor y > 1$$

$$-\frac{1}{9} \qquad 0 \qquad 1$$

$$y \gtrless 1$$
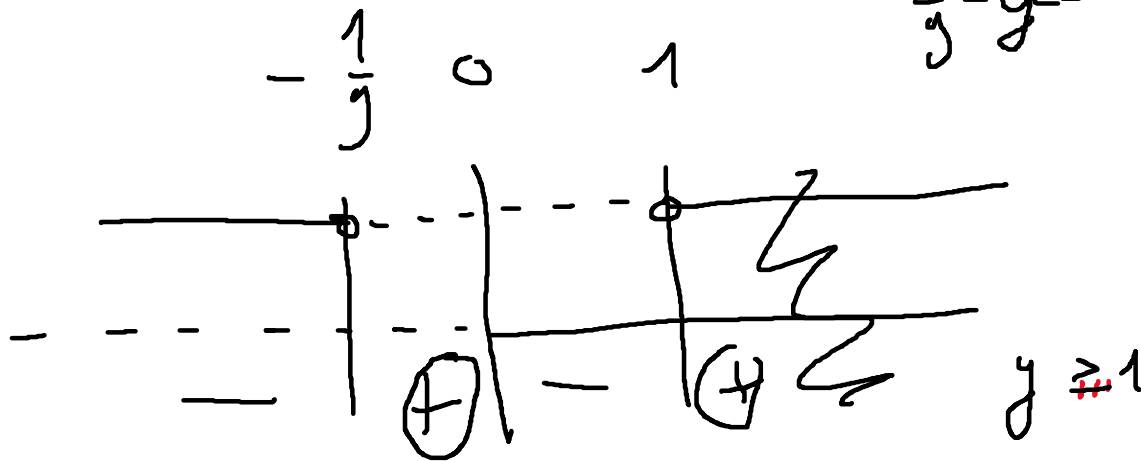
$$3^{x-1} \qquad -\frac{1}{9} < 3^{x-1} < 0 \lor 3^{x-1} > 1$$

$$\emptyset$$

$$3^{-2} = \frac{1}{3^2} = \frac{1}{9} \qquad 3^{x-1} > 3^0$$

$$x - 1 > 0$$

$$\boxed{x > 1}$$

$\boxed{x > 1}$

$x = 0$ $x = 1$ $x = -1$ -2 -3

$3^x = 3^0 = 1$ $3^{-1} = \frac{1}{3}$ $\frac{1}{9}$ $\frac{1}{27}$

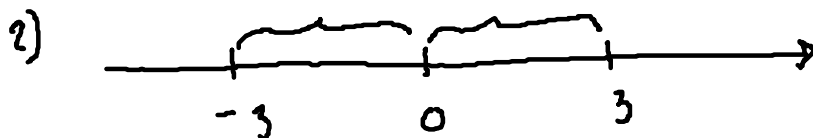$\left(\frac{1}{3}\right)^{x-1} > \left(\frac{1}{3}\right)^0$

$x - 1 < 0$

$\left(\frac{1}{3}\right)^x$

x_1 x_2
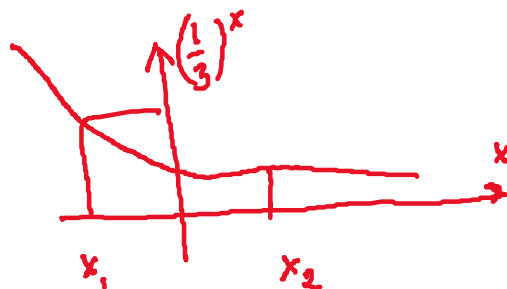
$2 - |\log_3 x| > 0$

$|3| = 3$ $|-3| = 3$

1) Число без знака

2)

-3 0 3

Расстояние до числа

3) $|a| = \begin{cases} a, & a \geq 0 \\ -a, & a < 0 \end{cases}$ $\checkmark$

$|3| = 3$ $|-3| = -(-3) = 3$

$3 + |x| = x - 5$ _____

$$3 + |x| = x - 5$$

$$\swarrow \; \underline{x > 0} \qquad \searrow \boxed{x < 0}$$

$$3 + x = x - 5 \qquad\qquad 3 - x = x - 5$$

$$\vdots \qquad\qquad\qquad \vdots$$

$$3 = -5 \qquad\qquad 3 + 8 = 2x$$

$$\emptyset \qquad\qquad x = \frac{11}{2}$$

$$\emptyset$$

$$2 - |\log_3 x| > 0$$

$$x? \quad \leftarrow \log_3 x \geq 0 \Big/ 1 \qquad\qquad \underline{2} \quad \log_3 x < 0$$

$$\qquad\qquad\qquad\qquad\qquad 2 + \log_3 x > 0 \leftarrow \underline{0 < x < 1}$$

$$\underline{x \geq 1} \longrightarrow 2 - \log_3 x > 0 \qquad 2 > \log_3 x$$

$$2 > \log_3 x \qquad\qquad -2 < \log_3 x \cdot \circ \frac{1}{9}$$

$$\log_3 \frac{1}{3} = -1 \quad \log_3 \frac{1}{9} \quad x > \frac{1}{9}$$

$$x \geq 1$$

$$b > 0$$
$$\log_a b \qquad a > 0, a \neq 1$$
$$\log_3 x \qquad x > 0$$

$$-2 < \log_3 x$$

$$2 > \log_3 x \qquad\qquad \log_3 \frac{1}{9} < \log_3 x$$

$$\log_3 9 > \text{...} \; x$$

$$\log_3 9 > \log_3 x$$

$$x < 9$$

$$\frac{1}{9} < x \qquad 0 < x < 1$$

$$\underline{x < 9 \lor x \geq 1} \qquad 1 \leq x < 9 \qquad \frac{1}{9} < x < 1$$

$$\begin{cases} x < 9 \lor x \geq 1 \\ \frac{1}{9} < x < 1 \end{cases}$$

$$\boxed{\frac{1}{9} < x < 9}$$

$$2 - |\log_3 x| > 0 \qquad\qquad 2 > |a|$$

$$2 > |\log_3 x|$$
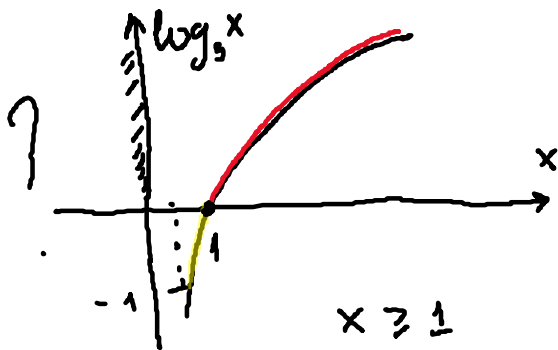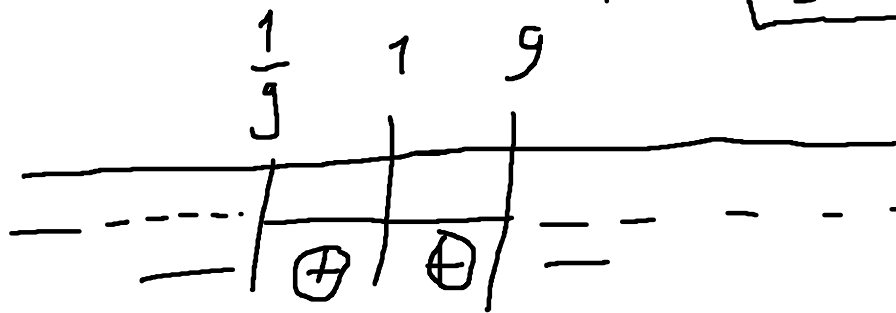
$$-2 < \log_3 x < 2 \qquad\qquad -2 < a < 2$$

$$\log_3 \frac{1}{9} < \log_3 x < \log_3 9$$

$$\boxed{\dfrac{1}{9} < x < 9}$$

$$8^{\frac{3x-1}{3}} = 4^{\frac{3x+1}{2}}$$

$$(2^3)^{\frac{3x-1}{3}} = (2^2)^{\frac{3x+1}{2}} \qquad \textcolor{red}{(a^n)^m = a^{n \cdot m}}$$

$$\left(\frac{3x-1}{3}\right) \cdot 3 = 2 \cdot \left(\frac{3x+1}{2}\right)$$

$$\textcolor{red}{2^{3 \cdot \frac{3x-1}{3}} = 2^{2 \cdot \frac{3x+1}{2}}}$$

$$3x - 1 = 3x + 1$$

$$\varnothing$$