

**Презентацию подготовила  
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Использовать на уроке  
повторения темы  
«Логарифмы».**

# **Задания первой части**

$$\text{а) } \text{Log}_5(6+X)=2; \quad X=19$$

$$\text{б) } \text{Log}_6(4+X)=2; \quad X=32$$

$$\text{в) } \text{Log}_3(X^2+X)=\text{Log}_3(X^2+3);$$
$$X=3$$

*№2.*

$$a) 7^{2+\text{Log}_7 6} = 7^2 * 7^{\text{Log}_7 6} = 294;$$

$$б) 3^{3+\text{Log}_3 12} = 3^3 * 3^{\text{Log}_3 12} = 324.$$

*№3.*

$$a) \frac{84}{5^{\text{Log}_5 7}} = \frac{84}{7} = 12;$$

$$б) \frac{42}{2^{\text{Log}_2 3}} = \frac{42}{3} = 14$$

№ 4.

$$a) \frac{\text{Log}_4 11}{\text{Log}_{64} 11} = \frac{\text{Log}_4 11}{\frac{1}{3} \text{Log}_4 11} = 3;$$

$$б) \frac{\text{Log}_3 13}{\text{Log}_{81} 13} = \frac{\text{Log}_3 13}{\frac{1}{4} \text{Log}_3 13} = 4.$$

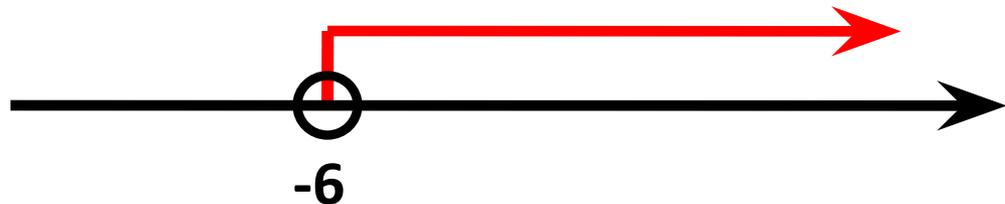
№5. Найдите наибольшее значение функции  $Y = \ln(x+6)^9 - 9x$  на  $[-5,5; 0]$

$$Y = 9\ln(x+6) - 9$$

$x$ ;

$$D(y): x+6 > 0$$

$$D(y) = (-6; +\infty)$$



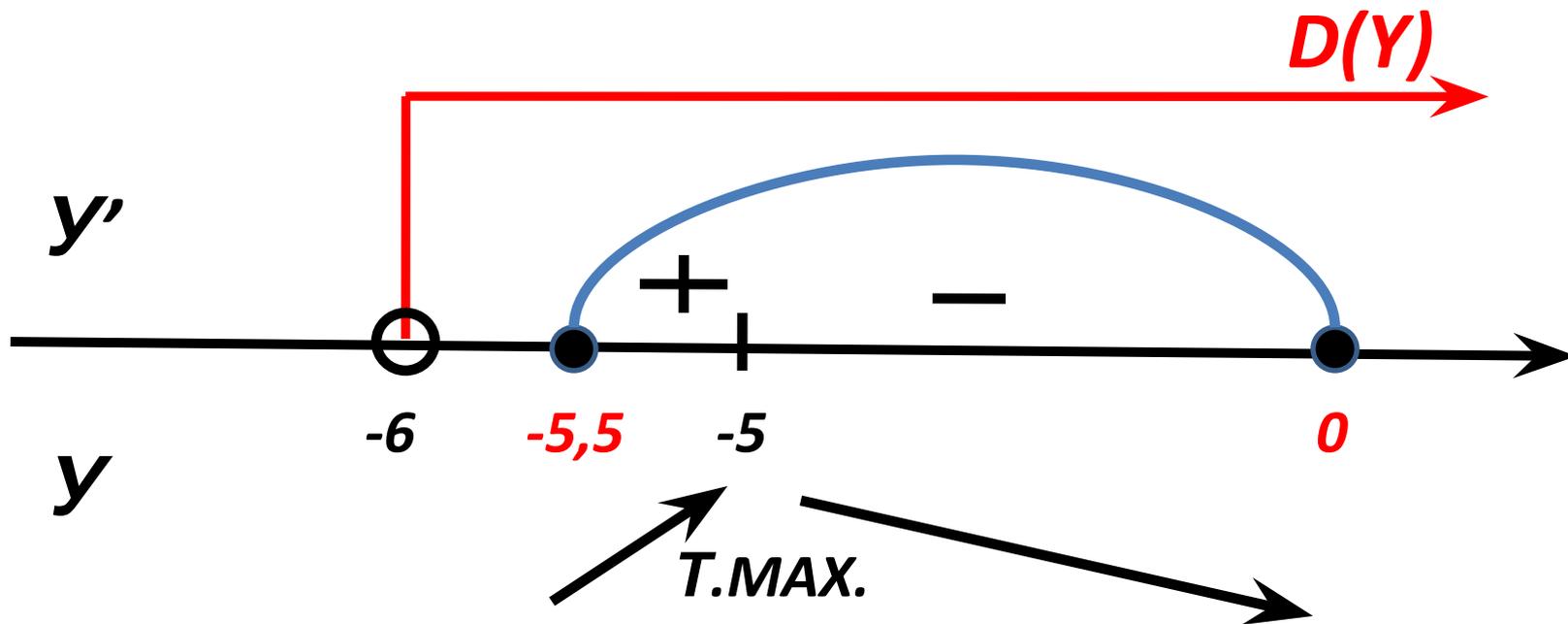
$$y' = \frac{9}{x+6} - 9$$

$$D(Y') = (-\infty; -6) \cup (-6; +\infty)$$

$$\frac{9}{x+6} = 9;$$

$$x+6 = 1;$$

$$x = -5.$$



$$Y_{\text{наиб.}} = Y(-5) = \ln(-5+6)^9 - 9 * (-5)$$

$$Y_{\text{наиб.}} = \ln 1 + 45;$$

$$Y_{\text{наиб.}} = 45$$

# **Задания второй части.**

**№1. Решить систему  
неравенств**

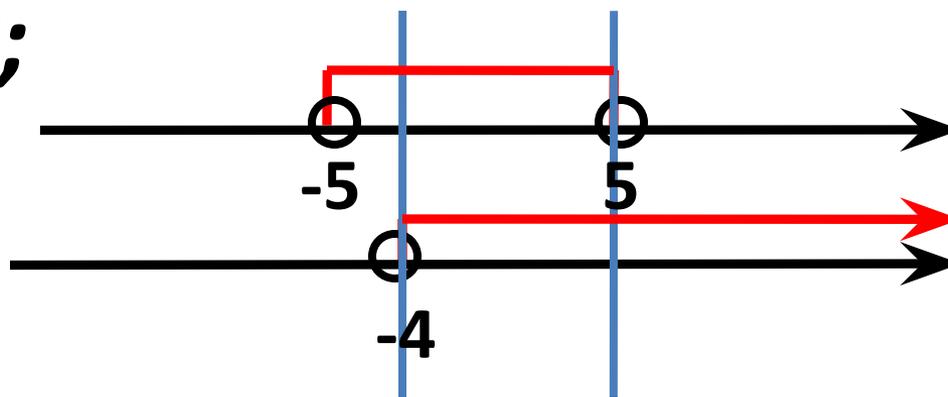
$$\begin{cases} \log_4(25-x^2) \leq 2 + \log_4(x+4) (*) \\ \log_{0,4}(2|x+4| + |x-6| - 18) < 1 (**) \end{cases}$$

**Решим неравенство (\*)**

$$\log_4(25-x^2) \leq 2 + \log_4(x+4)$$

**О.Д.З:**  $25-x^2 > 0;$

$x+4 > 0$



**О.Д.З: (-4;5)**

$$\log_4(25-x^2) \leq 2 \log_4 4 + \log_4(x+4);$$

$$\log_4(25-x^2) \leq \log_4(16x+64);$$

**Функция  $f(x) = \log_4 t$   
возрастающая,**

**т.к.  $a=4, a>1$ , то**

$$25-x^2 \leq 16x+64;$$

$$x^2 + 16x + 64 - 25 \geq 0;$$

$$x^2 + 16x + 39 \geq 0$$

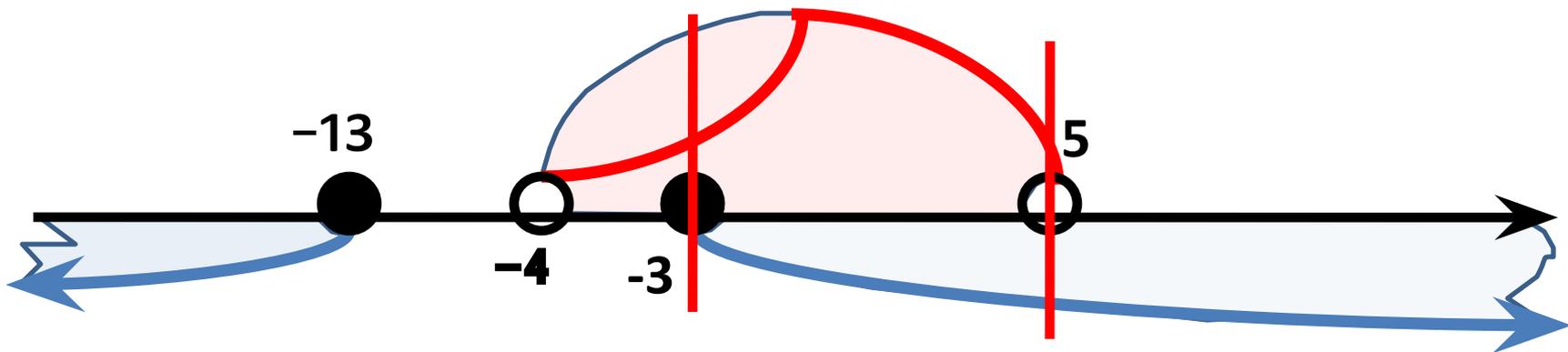
$$x^2 + 16x + 39 \geq 0$$

$$D = 256 - 4 \cdot 1 \cdot 39 = 100 > 0;$$

$$X_1 = -3; X_2 = -13$$



$$(-\infty; -13] \cup [-3; +\infty)$$



*$[-3;5)$*

**Решим неравенство (\*\*)**

$$\log_{0,4}(2|X+4|+|X-6|-18) < 1$$

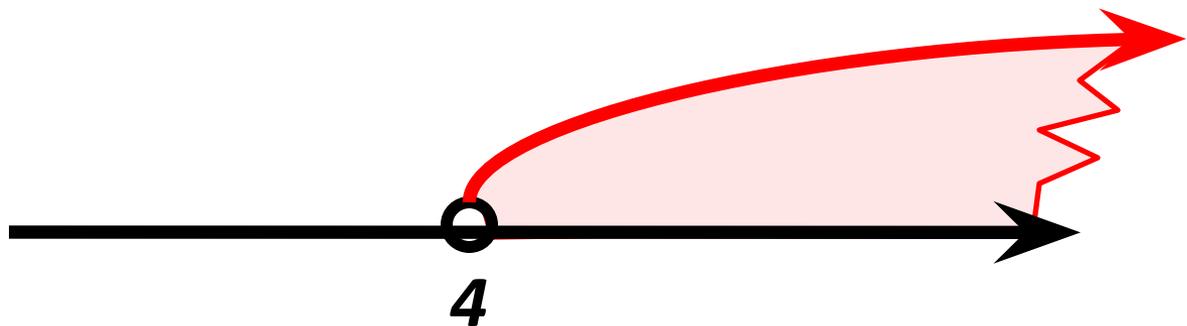
**Т.к.  $-3 \leq x < 5$ , то**

$$\log_{0,4}(2(X+4)+(6-X)-18) < \log_{0,4}0,4;$$

$$\log_{0,4}(X-4) < \log_{0,4}0,4;$$

$$\text{О.Д.З: } X-4 > 0;$$

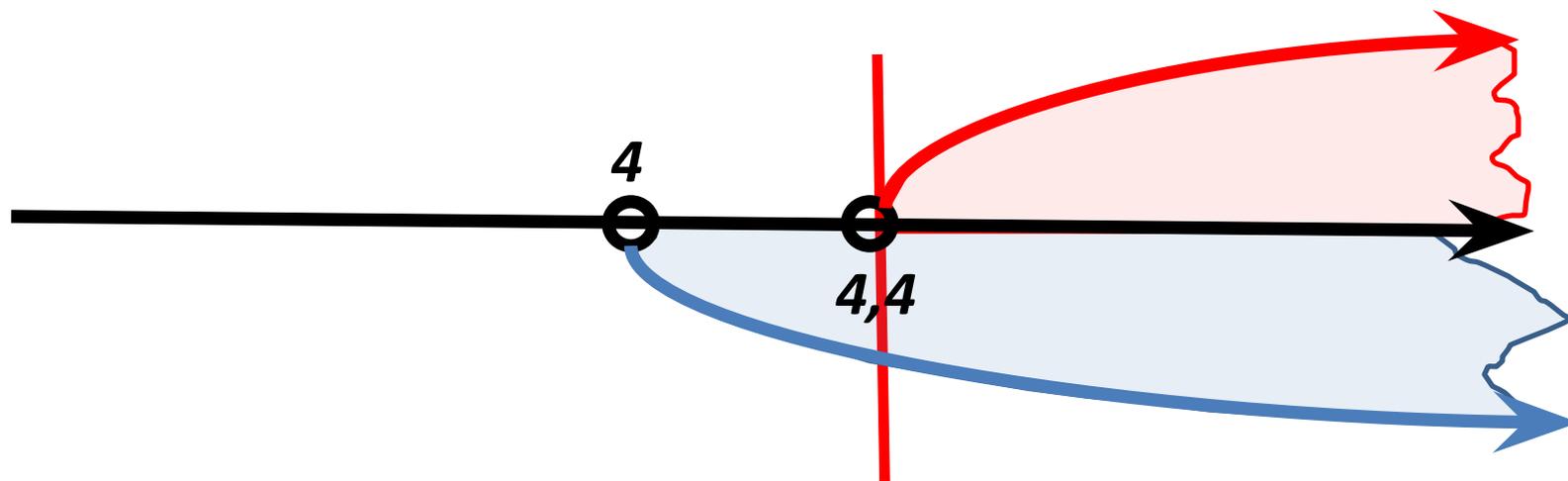
$$X > 4$$



Функция  $f(x) = \log_{0,4} x$  убывающая,  
т.к.  $a = 0,4, 0 < a < 1$ , то

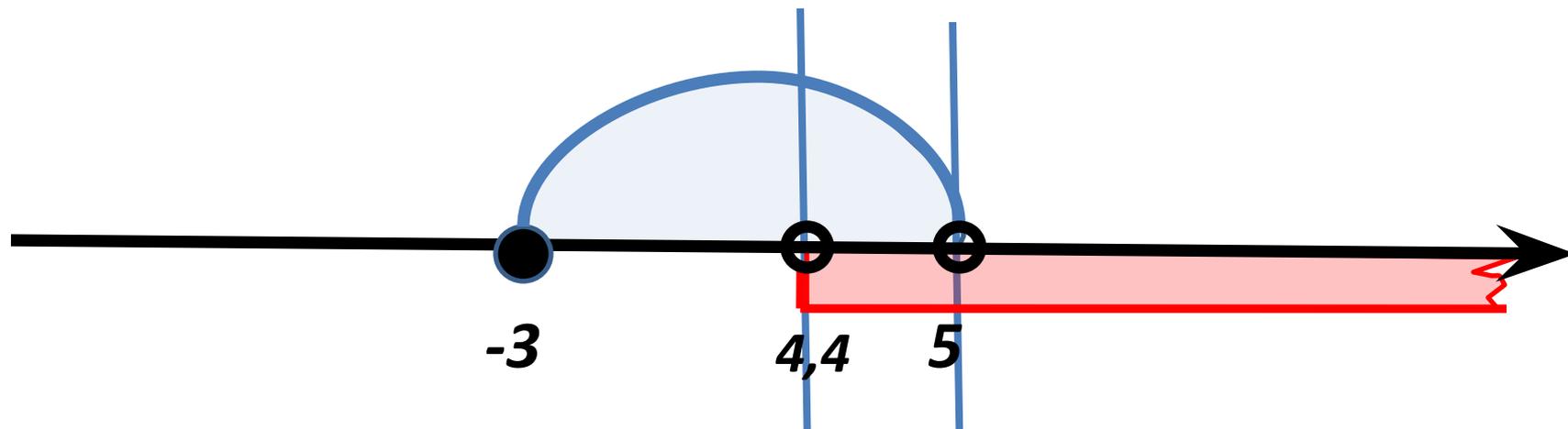
$x - 4 > 0,4$ ;

$x > 4,4$



$(4,4; +\infty)$

# Определим решение системы



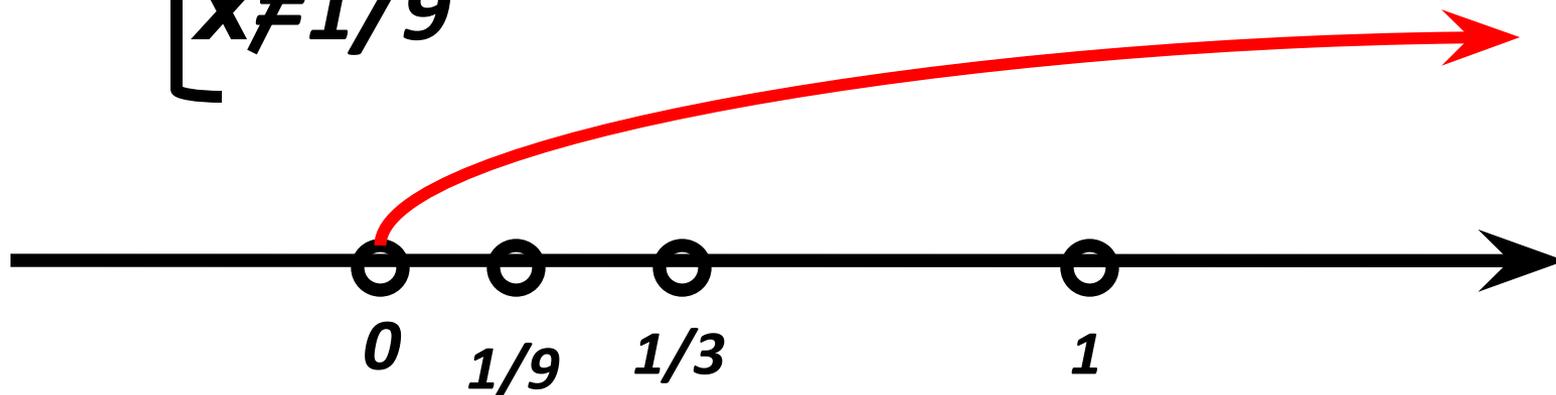
**Ответ:  $(4,4; 5)$**

## №2 Решите неравенство

$$\log_x 3 + 2\log_{3x} 3 - 6\log_{9x} 3 \leq 0$$

О.Д.З:

- $x > 0;$
- $x \neq 1;$
- $x \neq 1/3;$
- $x \neq 1/9$



$$\frac{1}{\text{Log}_3 x} + \frac{2}{\text{Log}_3 3x} - \frac{6}{\log_3 9x} \leq 0;$$

$$\frac{1}{\text{Log}_3 x} + \frac{2}{1 + \text{Log}_3 x} - \frac{6}{2 + \text{Log}_3 x} \leq 0.$$

*Пусть*

*Log<sub>3</sub>x = y, то*

$$\frac{1}{y} + \frac{2}{1+y} - \frac{6}{2+y} \leq 0$$

$$\frac{2 + 3y + y^2 + 4y + 2y^2 - 6y - 6y^2}{y(1+y)(2+y)} \leq 0;$$

$$\frac{-3y^2 + y + 2}{y(1+y)(2+y)} \leq 0.$$

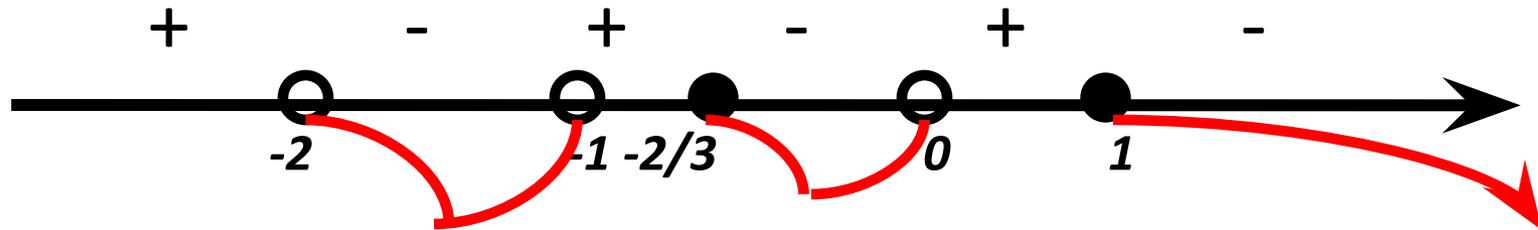
$$3y^2 - y - 2 = 0;$$

$$D = 1 + 24 = 25;$$

$$y_1 = 1; y_2 = -\frac{2}{3};$$

$$y(1 + y)(2 + y) \neq 0;$$

$$y \neq 0; y \neq -1; y \neq -2$$



$$-2 < y < -1; \quad -2/3 \leq y < 0; \quad y \geq 1$$

$$-2 < y < -1;$$

$$\text{Log}_3 \frac{1}{9} < \text{Log}_3 x < \text{Log}_3 \frac{1}{3};$$

$$\frac{1}{9} < x < \frac{1}{3}$$

$$-\frac{2}{3} \leq y < 0;$$

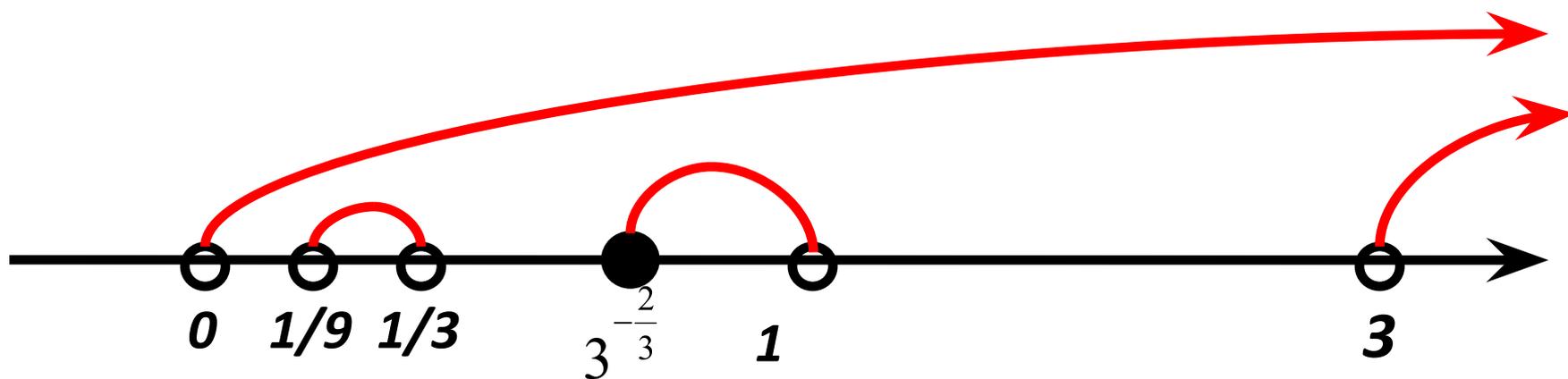
$$\text{Log}_3 3^{-\frac{2}{3}} \leq \text{Log}_3 x < \text{Log}_3 1;$$

$$3^{-\frac{2}{3}} \leq x < 1.$$

$$y \geq 1;$$

$$\text{Log}_3 y \geq \text{Log}_3 3;$$

$$y \geq 3.$$

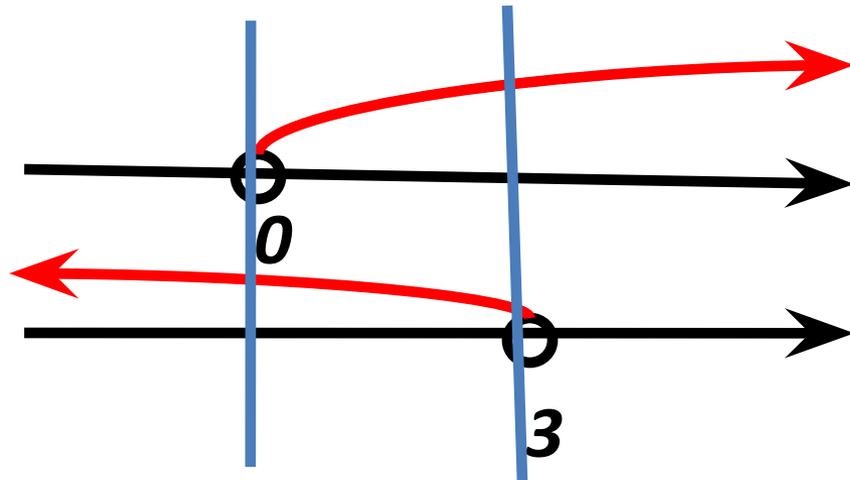


$$\frac{1}{9} < x < \frac{1}{3}; 3^{-\frac{2}{3}} \leq x < 1; x \geq 3$$

**№3 При каких значениях  $x$   
соответственные значения  
функций  $f \in \log_3 x$  и  $g \in \log_3(3-x)$   
будут отличаться больше,  
чем на 2?**

$$\text{Log}_3 x - \text{Log}_3 (3 - x) > 2;$$

$$\text{О.Д.З.} \begin{cases} X > 0; \\ 3 - X > 0 \end{cases}$$



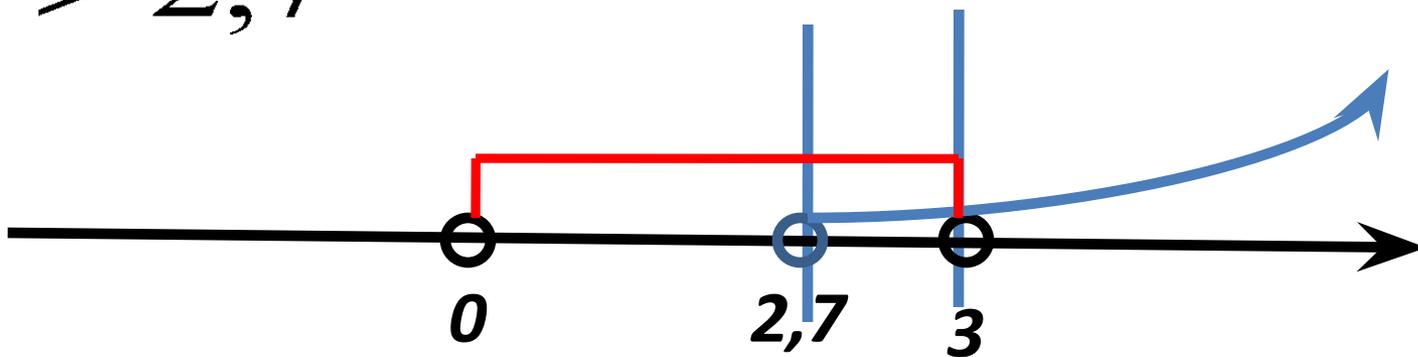
$(0;3)$

$$\text{Log}_3 x - \text{Log}_3 (3 - x) = \text{Log}_3 9;$$

$$\text{Log}_3 x > \text{Log}_3 (3 - x) + \text{Log}_3 9;$$

$$x > 27 - 9x;$$

$$x > 2,7$$



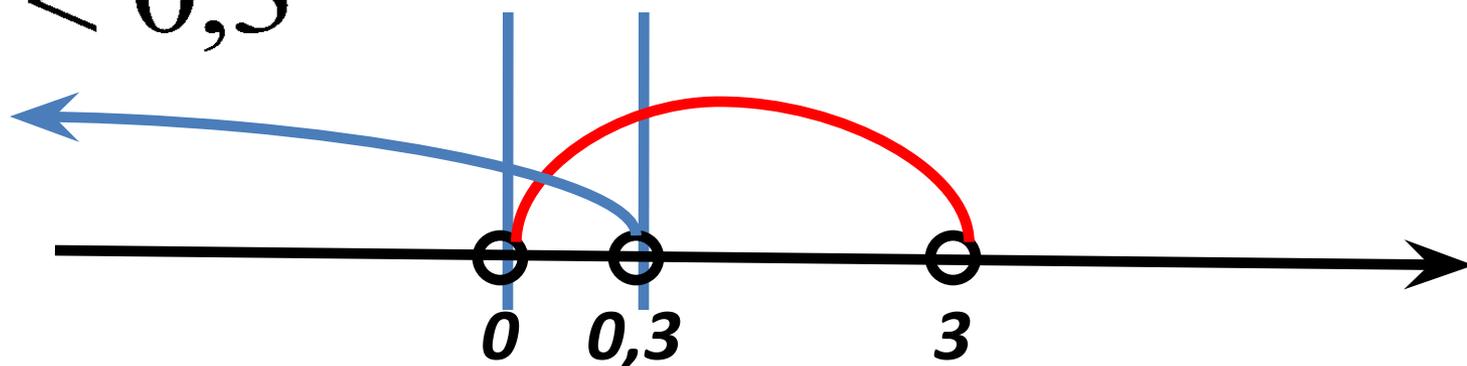
**(2,7; 3)**

$$\text{Log}_3(3-x) - \text{Log}_3 x > 2;$$

$$\text{Log}_3(3-x) > \text{Log}_3 x + \text{Log}_3 9;$$

$$3-x > 9x;$$

$$x < 0,3$$



**$(0; 0,3)$**

**$(0; 0,3) \cup (2,7; 3)$**