

15.1. [ЕГЭ-2023] Решите неравенство: $4 \cdot \underbrace{4^{x^2+2x-5}} - 33 \cdot \underbrace{2^{x^2+2x-5}} + 8 \geq 0$.

Замена: $t = 2^{x^2+2x-5} > 0 \Rightarrow 4^{x^2+2x-5} = 2^{2(x^2+2x-5)} = t^2$

$$4t^2 - 33t + 8 \geq 0$$

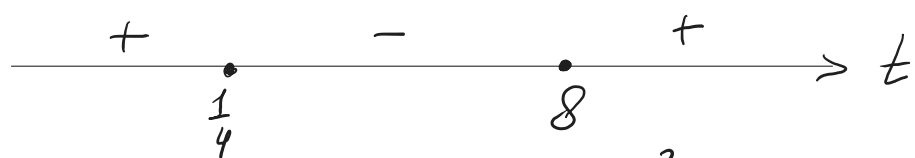
$$4t^2 - 33t + 8 = 0$$

$$D = 33^2 - 4 \cdot 4 \cdot 8 = 1089 - 128 = 961 = 31^2$$

$$t_{1,2} = \frac{33 \pm 31}{8}$$

$$t_1 = \frac{2}{8} = \frac{1}{4}$$

$$t_2 = \frac{64}{8} = 8$$



$$\begin{cases} t \leq \frac{1}{4} \\ t \geq 8 \end{cases}$$

$$\begin{cases} 2^{x^2+2x-5} \leq 2^{-2} \\ 2^{x^2+2x-5} \geq 2^3 \end{cases}$$

$$\begin{cases} x^2+2x-5 \leq -2 \\ x^2+2x-5 \geq 3 \end{cases}$$

$$\begin{cases} x^2+2x-3 \leq 0 \\ x^2+2x-8 \geq 0 \end{cases}$$

$$\begin{cases} -3 \leq x \leq 1 \\ x \leq -4, x \geq 2 \end{cases}$$

$$x^2+2x-3=0$$

$$x_1+x_2=-2$$

$$x_1 \cdot x_2 = -3$$

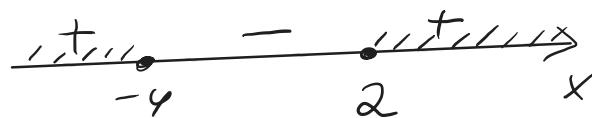
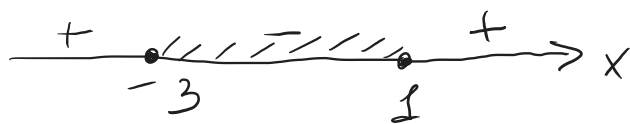
$$x_1 = -3, x_2 = 1$$

$$x^2+2x-8=0$$

$$x_1+x_2=-2$$

$$x_1 \cdot x_2 = -8$$

$$x_1 = -4, x_2 = 2$$



Ответ: $(-\infty; -4] \cup [-3; 1] \cup [2; +\infty)$