

Resolva as seguintes inequações exponenciais:

1. $\rightarrow a > 1$
 $2^x < 32$
 $\frac{2^x}{2^5} < \frac{2^5}{2^5}$
 bases iguais
 $x < 5$
 $S = \{x \in \mathbb{R} / x < 5\}$

2.
 $\left(\frac{1}{3}\right)^x > \frac{1}{81}$
 $\left(\frac{1}{3}\right)^x > \frac{1}{3^4}$
 $x < 4$
 $S = \{x \in \mathbb{R} / x < 4\}$
 $\rightarrow 0 < a < 1$
 $\left(\frac{1}{3}\right)^x > \left(\frac{1}{3}\right)^4$
 inverte

3.
 $\left(\frac{1}{5}\right)^x \geq 125$
 $\left(\frac{1}{5}\right)^x \geq 5^3$
 $5^{-x} \geq 5^3$
 $\rightarrow a > 1$
 $-x \geq 3 \cdot (-1)$
 \rightarrow inverte
 $S = \{x \in \mathbb{R} / x \leq -3\}$

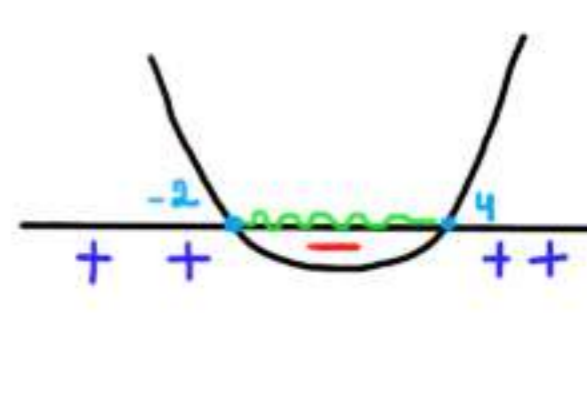
4.
 $(\sqrt[3]{3})^x \leq \frac{1}{9}$
 $(3^{1/3})^x \leq \frac{1}{3^2}$
 $3^{1/3 x} \leq 3^{-2}$
 $\rightarrow a > 1$
 $\frac{1}{3} x \leq -2$
 $x \leq -2 \cdot \frac{3}{1} \cdot \frac{1}{3}$ (mult. eq.)
 $S = \{x \in \mathbb{R} / x \leq -6\}$

5.
 $(\sqrt[5]{25})^x < \frac{1}{\sqrt[4]{125}}$
 $(25^{1/5})^x < \frac{1}{125^{1/4}}$
 $(5^2)^{1/5 x} < \frac{1}{(5^3)^{1/4}}$
 $5^{2/5 x} < 5^{-3/4}$
 $\rightarrow a > 1$
 $\frac{2}{5} x < -\frac{3}{4}$
 $x < -\frac{3}{4} \cdot \frac{5}{2}$
 $x < -\frac{15}{8}$
 $S = \{x \in \mathbb{R} / x < -15/8\}$

6.
 $(0,008)^x > \sqrt[3]{25}$
 $0,008 = \frac{8^{1/3}}{1000} = \frac{1}{125}$
 $\left(\frac{1}{125}\right)^x > 25^{1/3}$
 $\left(\frac{1}{5^3}\right)^x > (5^2)^{1/3}$
 $5^{-3x} > 5^{2/3}$
 $-3x > \frac{2}{3}$
 $-x > \frac{2}{9} \cdot (-1)$
 $x < -2/9$
 $S = \{x \in \mathbb{R} / x < -2/9\}$

7.
 $(0,1)^{3-4x} < 0,0001$
 $0,1 = \frac{1}{10^1}$; $0,0001 = \frac{1}{10^4} = \frac{1}{10^4}$
 $\left(\frac{1}{10}\right)^{3-4x} < \frac{1}{10^4}$
 $\left(\frac{1}{10}\right)^{3-4x} < \left(\frac{1}{10}\right)^4$
 $\rightarrow 0 < a < 1$
 $3-4x > 4$
 $-4x > 1 \cdot (-1)$
 $x < -1/4$
 $S = \{x \in \mathbb{R} / x < -1/4\}$

8.
 $(0,42)^{1-2x} \geq 1$
 $0,42 = \frac{42^{1/2}}{100} = \frac{21}{50}$
 $\left(\frac{21}{50}\right)^{1-2x} \geq \left(\frac{21}{50}\right)^0$
 $\rightarrow 0 < a < 1$
 $1-2x \leq 0$
 $-2x \leq -1 \cdot (-1)$
 $x \geq 1/2$
 $S = \{x \in \mathbb{R} / x \geq 1/2\}$

9.
 $(0,3)^{x^2-2x-8} \geq 1$
 $0,3 = \frac{3}{10}$
 $\left(\frac{3}{10}\right)^{x^2-2x-8} \geq \left(\frac{3}{10}\right)^0$
 $\rightarrow 0 < a < 1$
 $x^2 - 2x - 8 \leq 0$
 $\frac{-2}{2} \pm \frac{\sqrt{4+32}}{2} = \frac{-2 \pm 6}{2} = 2$
 $\frac{-2}{2} \cdot \frac{4}{2} = c/a = -8$

 $S = \{x \in \mathbb{R} / -2 \leq x \leq 4\}$

10.
 $2^{x-1} + 2^x + 2^{x+1} - 2^{x+2} + 2^{x+3} > 240$
 $\frac{2^x}{2} + 2^x + 2^x \cdot 2 - 2^x \cdot 2^2 + 2^x \cdot 2^3 > 240 \cdot 2$
 $\frac{2^x}{2} + 2^x \cdot 2 + 2^x \cdot 2 \cdot 2 - 2^x \cdot 2^2 \cdot 2 + 2^x \cdot 2^3 \cdot 2 > 240 \cdot 2$
 $\text{Fator comum} = 2^x$
 $2^x(1+2+4-8+16) > 240 \cdot 2$
 $2^x > \frac{240 \cdot 2}{15}$
 $2^x > 2^4 \cdot 2$
 $\rightarrow a > 1$
 $2^x > 2^5$
 $x > 5$
 $S = \{x \in \mathbb{R} / x > 5\}$

11.
 $3^{2x+1} - 9^x - 3^{2x-1} - 9^{x-1} \leq 42$
 $3^{2x} \cdot 3^1 - 3^{2x} - \frac{3^{2x}}{3^1} - \frac{3^{2x}}{3^2} \leq 42 \cdot 3^2$
 $3^{2x} \cdot 3^3 - 3^{2x} \cdot 3^2 - 3^{2x} \cdot 3 - 3^{2x} \leq 42 \cdot 3^2$
 $3^{2x}(27-9-3-1) = 42 \cdot 3^2$
 $3^{2x} \leq \frac{42 \cdot 3^2}{14}$
 $3^{2x} \leq 3 \cdot 3^2$
 $3^{2x} \leq 3^3$
 $2x \leq 3$
 $x \leq 3/2$
 $S = \{x \in \mathbb{R} / x \leq 3/2\}$