DISEQUAZIONI ESPONENZIALI
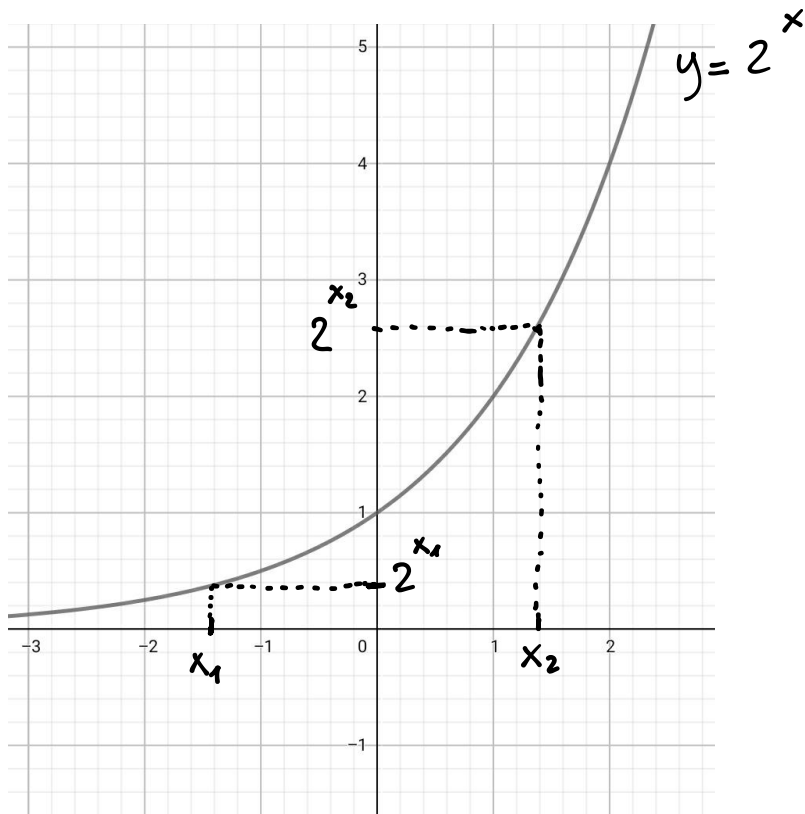
$y = 2^x$ è CRESCENTE, CIOÈ $\qquad x_1 < x_2 \Longleftrightarrow 2^{x_1} < 2^{x_2}$

$y = a^x$ CON $a > 1$ È CRESCENTE

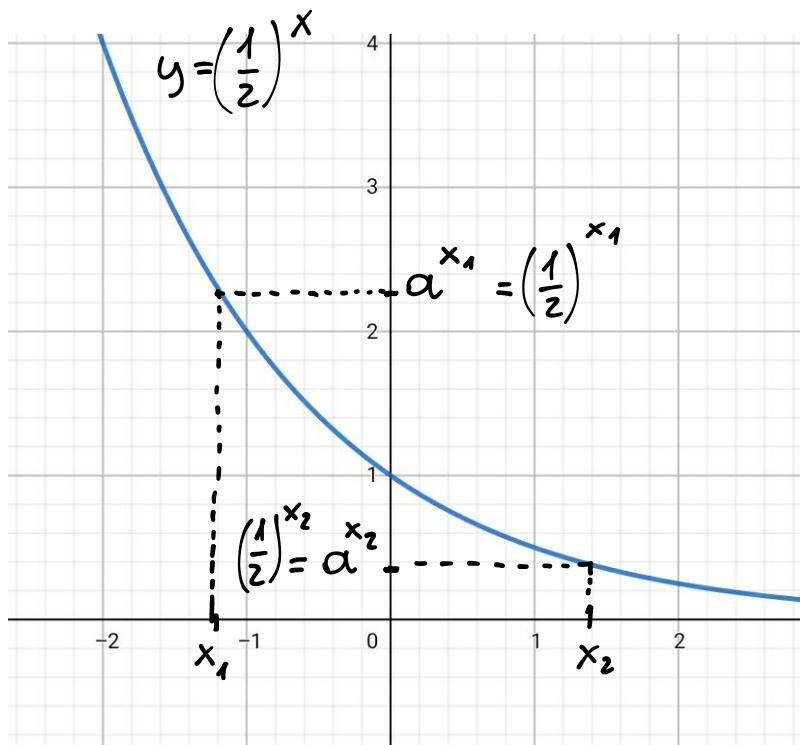$\qquad\qquad\qquad \hookrightarrow \quad x_1 < x_2 \Longleftrightarrow a^{x_1} < a^{x_2}$

ESEMPIO DI DISEQUAZIONE

1) $2^x < 16 \qquad 2^x < 2^4 \qquad x < 4$

2) $3^{x+1} \geq 9 \qquad 3^{x+1} \geq 3^2 \qquad x + 1 \geq 2$

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad \downarrow$

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad x \geq 1$

Graph with $y = \left(\frac{1}{2}\right)^x$

$a^{x_1} = \left(\frac{1}{2}\right)^{x_1}$

$\left(\frac{1}{2}\right)^{x_2} = a^{x_2}$

$y = a^x$ con $0 < a < 1$

è DECRESCENTE!

$x_1 < x_2 \iff a^{x_1} > a^{x_2}$

ES. 1) $\left(\frac{1}{2}\right)^x < \frac{1}{8}$ $\left(\frac{1}{2}\right)^x < \left(\frac{1}{2}\right)^3$ $\boxed{x > 3}$

SE LA BASE È $0 < a < 1$ SI INVERTE LA DISUGUAGLIANZA
SE LA BASE È $a > 1$ SI MANTIENE LA DISUGUAGLIANZA

quando
passo agli esponenti

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$\left(\frac{2}{5}\right)^{x+3} < \left(\frac{5}{2}\right)^{x-2}$ $\frac{5}{2} = \left(\frac{2}{5}\right)^{-1}$

$\left(\frac{2}{5}\right)^{x+3} < \left[\left(\frac{2}{5}\right)^{-1}\right]^{x-2}$

$\left(\frac{2}{5}\right)^{x+3} < \left(\frac{2}{5}\right)^{-x+2}$ $\Longrightarrow$ $x + 3 > -x + 2$

perché
$0 < \frac{2}{5} < 1$

$2x > -1$ $\boxed{x > -\frac{1}{2}}$

ALTRO MODO $\left(\frac{5}{2}\right)^{-x-3} < \left(\frac{5}{2}\right)^{x-2}$ $\Longrightarrow$ $-x-3 < x-2$ $-2x < 1$

$\frac{5}{2} > 1$

$x > -\frac{1}{2}$

$$\cancel{17} \sqrt{2^{x+1}} > \cancel{34} \sqrt[3]{4^{x-3}}$$

$$2^{\frac{x+1}{2}} > 2 \cdot 2^{\frac{2(x-3)}{3}}$$

$$2 \cdot 2^{PINCO} = 2^{1+PINCO}$$

$$2^{\frac{x+1}{2}} > 2^{1+\frac{2(x-3)}{3}}$$

perché
2 > 1

$$\frac{x+1}{2} > 1 + \frac{2(x-3)}{3}$$

$$\frac{3x+3}{\cancel{6}} > \frac{6+4x-12}{\cancel{6}}$$

$$3x - 4x > 6 - 12 - 3$$

$$-x > -9$$

$$\boxed{x < 9}$$