3.70

$$\log_{|3x-3|}(25^x-9^x) < \log_{|3x-3|}(5^x+3^x) + \log_{|3x-3|}(5^{x-1}+3^{x-1})$$

תנאי הגדרה

$5^{x-1}+3^{x-1}>0$ — $x \in \mathbb{R}$

$5^x+3^x>0$ — $x \in \mathbb{R}$

$25^x-9^x>0$

$25^x>9^x$

$\left(\frac{25}{9}\right)^x > \left(\frac{25}{9}\right)^0$

$0 < x$

$|3x-3| \neq 1$, $|3x-3| \neq 0$

$x \neq \frac{4}{3}$, $x \neq \frac{2}{3}$, $x \neq 1$

$$\log_{|3x-3|}(25^x-9^x) - \log_{|3x-3|}(5^x+3^x) - \log_{|3x-3|}(5^{x-1}+3^{x-1}) < 0$$

$$\log_{|3x-3|}\left[\frac{25^x-9^x}{(5^x+3^x)(5^{x-1}+3^{x-1})}\right] = \log_{|3x-3|}\left[\frac{(5^x+3^x)(5^x-3^x)}{(5^x+3^x)(5^{x-1}+3^{x-1})}\right]$$

$$0 > \log_{|3x-3|}\left[\frac{5^x-3^x}{5^{x-1}+3^{x-1}}\right]$$

$$\log_{|3x-3|}1 > \log_{|3x-3|}\left[\frac{5^x-3^x}{5^{x-1}+3^{x-1}}\right]$$

$$\left(|3x-3|-1\right)\left(\frac{5^x-3^x}{5^{x-1}+3^{x-1}}-1\right) < 0$$

מתאפס

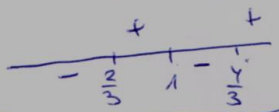
$x = \frac{4}{3}, \frac{2}{3}$

$$\frac{5^x-3^x-5^{x-1}-3^{x-1}}{5^{x-1}+3^{x-1}} = 0$$

$$5^{x-1}(5-1) = 3^{x-1}(3+1)$$

$$\frac{5^{x-1}}{3^{x-1}} = \frac{4}{4} = 1$$

$$\left(\frac{5}{3}\right)^{x-1} = 1 \rightarrow \boxed{x=1}$$



$0 < x < \frac{2}{3}$, $1 < x < \frac{4}{3}$

תנאי הגדרה