

## Exponenciální rovnice - rce s neznámou v exponentu

$$2^x + 4^x = 16$$

Způsoby řešení exponenciálních rovnic:

a)  $a^x = a^y \Rightarrow x = y$

b) substitucí

c) vytýkáním

d) logaritmicky

Řešené příklady:

$$2^{2x} = 16$$

$$2^{2x} = 2^4$$

$$2x = 4$$

$$x = 2$$

$$\text{NSolve}[2^{2x} == 16, x]$$

$$\{x \rightarrow 2.\}$$

$$5^{x-4} = 0,008$$

$$5^{x-4} = \frac{8}{1000}$$

$$5^{x-4} = \frac{1}{125}$$

$$5^{x-4} = 5^{-3}$$

$$x - 4 = -3$$

$$x = 1$$

$$\text{NSolve}[5^{(x-4)} == 0.008, x]$$

$$\{\{x \rightarrow 1.\}\}$$

$$\left(\frac{4}{25}\right)^{x+3} \cdot \left(\frac{125}{8}\right)^{4x-1} = \frac{5}{2}$$

$$\left(\frac{5}{2}\right)^{-2x-6} \cdot \left(\frac{5}{2}\right)^{12x-3} = \frac{5}{2}$$

$$\left(\frac{5}{2}\right)^{10x-9} = \left(\frac{5}{2}\right)$$

$$10x - 9 = 1$$

$$10x = 10$$

$$x = 1$$

$$\text{NSolve}\left[\left(\frac{4}{25}\right)^{x+3} * \left(\frac{125}{8}\right)^{4x-1} == \frac{5}{2}, x\right]$$

$$\{\{x \rightarrow 1.\}\}$$

$$2^{x+7} \sqrt[2^{x+7}]{4^{13-x}} = 1024$$

$$4^{\frac{13-x}{2^{x+7}}} = 2^{10}$$

$$2^{2 \frac{13-x}{2^{x+7}}} = 2^{10}$$

$$\frac{(26 - 2x)}{2^{x+7}} = 10$$

$$26 - 2x = 20x + 70$$

$$-44 = 22x$$

$$x = -2$$

$$\text{FindRoot}\left[2^{x+7} \sqrt[2^{x+7}]{4^{13-x}} == 1024, \{x, 0\}\right]$$

$$\{x \rightarrow -2.\}$$

## Úlohy k řešení:

(kontrolu správnosti proveďte v programu Mathematica)

$$a) \left(1 - \frac{5}{9}\right)^{\frac{2}{3-2x}} = \left(\frac{9}{4}\right)^{\frac{3}{x-3}}$$

$$b) \frac{10x^2}{2-15} = \frac{5-15}{1012-12x}$$

$$c) \left(\frac{4}{9}\right)^x \cdot \left(\frac{27}{8}\right)^{x-1} = \frac{2}{3}$$

$$d) 27^{5x-6} \cdot 81^{2x+3} = 9^{4x-2} \cdot 3^{7x-2}$$

## Výsledky:

$$\text{In}[86]:= \text{NSolve}\left[\left(1 - \frac{5}{9}\right)^{\frac{2}{3-2x}} == \left(\frac{9}{4}\right)^{\frac{3}{x-3}}, x\right]$$

$$\text{Out}[86]= \{\{x \rightarrow 0.75\}\}$$

$$\text{In}[85]:= \text{NSolve}\left[\frac{10^{x^2}}{2^{-15}} == \frac{5^{-15}}{10^{12-12x}}, x\right]$$

$$\text{Out}[85]= \{\{x \rightarrow 3.\}, \{x \rightarrow 9.\}\}$$

$$\text{In}[88]:= \text{NSolve}\left[\left(\frac{4}{9}\right)^x * \left(\frac{27}{8}\right)^{x-1} == \frac{2}{3}, x\right]$$

$$\text{Out}[88]= \{\{x \rightarrow 2.\}\}$$

$$\text{In}[89]:= \text{NSolve}\left[27^{5x-6} * 81^{2x+3} == 9^{4x-2} * 3^{7x-2}, x\right]$$

$$\{x \rightarrow 0.\}$$