Arithmetik – Exponentialgleichungen u. logarithmische Gleichungen

Lösungsblatt 2

Lösen Sie folgende Gleichungen in R !

$3^{2x-1} = 2^{x+3}$

$(2x-1) \cdot \log 3 = (x+3) \cdot \log 2$

$2x \cdot \log 3 - \log 3 = x \cdot \log 2 + 3 \cdot \log 2$

$2x \cdot \log 3 - x \cdot \log 2 = 3 \cdot \log 2 + \log 3$

$x \cdot (2 \cdot \log 3 - \log 2) = 3 \cdot \log 2 + \log 3$

$x = \frac{3 \cdot \log 2 + \log 3}{2 \cdot \log 3 - \log 2}$

$x = 2{,}11296$

$12^x = 7$

$x \cdot \log 12 = \log 7$

$x = \frac{\log 7}{\log 12}$

$x = 0{,}78309$

$\rightarrow \quad 12^{0{,}78..} = 6{,}99\ldots\ldots \sim 7$

$\log 3x + \log x = \log 48$

$\log 3x^2 = \log 48$

$3x^2 = 48 \quad | : 3$

$x^2 = 16 \quad | \sqrt{\ }$

$x_{1,2} = \pm 4$

$\left(\frac{4}{9}\right)^{x-2} = \frac{256}{6561}$

$(x-2) \cdot (\log 4 - \log 9) = \log 256 - \log 6561$

$x-2 = \frac{\log 256 - \log 6561}{\log 4 - \log 9}$

$x-2 = 4$

$x = 6 \quad \rightarrow \quad 4^4 = 256; \quad 9^4 = 6561$

$9^{4-3x} = 4^{6-x} \cdot 3^{4x-3}$

$(4-3x) \cdot \log 9 = (6-x) \cdot \log 4 + (4x-3) \cdot \log 3$

$4.\log 9 - 3x.\log 9 = 6.\log 4 - x.\log 4 + 4x.\log 3 - 3.\log 3$

$x.\log 4 - 4x.\log 3 - 3x.\log 9 = 6.\log 4 - 3.\log 3 - 4.\log 9$

$x \cdot (\log 4 - 4.\log 3 - 3.\log 9) = (6.\log 4 - 3.\log 3 - 4.\log 9)$

$x = \frac{6.\log 4 - 3.\log 3 - 4.\log 9}{\log 4 - 4.\log 3 - 3.\log 9}$

$x = 0{,}39239$

$7^{\log x} = 2401$

$7^{\log x} = 7^4$

$\log x \cdot \log 7 = 4 \cdot \log 7 \quad | : \log 7$

$\log x = 4 \quad \rightarrow$ TR: > 2nd > log > 4 = 10000

$x = 10000 \quad \rightarrow \quad \log 10000 = \mathbf{4}; \quad 7^4 = 2401$

$8^{4-3x} = 6^{6-x} \cdot 5^{4x-3}$

$(4-3x) \cdot \log 8 = (6-x) \cdot \log 6 + (4x-3) \cdot \log 5$

$4.\log 8 - 3x.\log 8 = 6.\log 6 - x.\log 6 + 4x.\log 5 - 3.\log 5$

$x.\log 6 - 4x.\log 5 - 3x.\log 8 = 6.\log 6 - 3.\log 5 - 4.\log 8$

$x \cdot (\log 6 - 4.\log 5 - 3.\log 8) = (6.\log 6 - 3.\log 5 - 4.\log 8)$

$x = \frac{6.\log 6 - 3.\log 5 - 4.\log 8}{\log 6 - 4.\log 5 - 3.\log 8}$

$x = 0{,}220089$

$\log 4x + \log 8x = \log 288$

$\log 32x^2 = \log 288$

$32x^2 = 288 \quad | : 32$

$x^2 = 9 \quad | \sqrt{\ }$

$x_{1,2} = \pm 3$

$9^{3x-6} = 4^{x+2} : 2^{4x}$

$(3x-6) \cdot \log 9 = (x+2) \cdot \log 4 - 4x \cdot \log 2$

$3x \cdot \log 9 - 6 \cdot \log 9 = x \cdot \log 4 + 2 \cdot \log 4 - 4x \cdot \log 2$

$3x \cdot \log 9 - x \cdot \log 4 + 4x \cdot \log 2 = 6 \cdot \log 9 + 2 \cdot \log 4$

$x \cdot (3 \cdot \log 9 - \log 4 + 4 \cdot \log 2) = 6 \cdot \log 9 + 2 \cdot \log 4$

$x = \frac{6 \cdot \log 9 + 2 \cdot \log 4}{3 \cdot \log 9 - \log 4 + 4 \cdot \log 2}$

$x = 2 \quad \rightarrow \quad 9^0 = 4^4 : 2^8 \quad \rightarrow \quad 1 = 256 : 256 \quad \rightarrow \quad 1 = 1$

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