Arithmetik – Exponentialgleichungen u. logarithmische Gleichungen

Lösungsblatt 1

Lösen Sie folgende Gleichungen in R !

$3^x = \frac{1}{9}$

$x \cdot \log 3 = \log 1 - \log 9$

$x \cdot \log 3 = 0 - \log 9 \quad | : \log 3$

$x = -\frac{\log 9}{\log 3}$

$\underline{x = -2} \quad \rightarrow \quad 3^{-2} = \frac{1}{9}$

$9^x = 8{,}1$

$x \cdot \log 9 = \log 8{,}1$

$x = \frac{\log 8{,}1}{\log 9}$

$\underline{x = 0{,}9520} \quad \rightarrow \quad 9^{0{,}95..} = 8{,}1$

$\log x + \log 4x = \log 36$

$\log 4x^2 = \log 36$

$4x^2 = 36 \quad | : 4$

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

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

$(\frac{4}{9})^{x-2} = \frac{8}{27}$

$(x - 2) \cdot (\log 4 - \log 9) = (\log 8 - \log 27)$

$x - 2 = \frac{\log 8 - \log 27}{\log 4 - \log 9}$

$x - 2 = 1{,}5 \quad | + 2$

$\underline{x = 3{,}5} \quad \rightarrow \quad 4^{1,5} = 8; \quad 9^{1,5} = 27;$

$6^{3-4x} = 8^{7-x} \cdot 5^{4x-7}$

$(3-4x) \cdot \log 6 = (7-x) \cdot \log 8 + (4x-7) \cdot \log 5$

$3 \cdot \log 6 - 4x \cdot \log 6 = 7 \cdot \log 8 - x \cdot \log 8 + 4x \cdot \log 5 - 7 \cdot \log 5$

$x \cdot (-4 \cdot \log 6 + \log 8 - 4 \cdot \log 5) = 7 \cdot \log 8 - 7 \cdot \log 5 - 3 \cdot \log 6$

$x = \frac{7 \cdot \log 8 - 7 \cdot \log 5 - 3 \cdot \log 6}{-4 \cdot \log 6 + \log 8 - 4 \cdot \log 5}$

$\underline{x = 0{,}18093}$

$2^{\log x} = 8$

$2^{\log x} = 2^3$

$\log x = 3 \quad \rightarrow$ TR: 2nd > log > 3 = 1000

$\underline{x = 1000}$

$(\frac{16}{25})^{2-x} = \frac{64}{125}$

$(2 - x) \cdot (\log 16 - \log 25) = (\log 64 - \log 125)$

$2 - x = \frac{\log 64 - \log 125}{\log 16 - \log 25}$

$2 - x = 1{,}5 \quad | - 2$

$\underline{-x = -0{,}5;} \quad \underline{+x = +0{,}5} \quad \rightarrow \quad 16^{1,5} = 64; \quad 25^{1,5} = 125;$

$8{,}25^{x+1} = 20{,}4$

$(x+1) \cdot \log 8{,}25 = \log 20{,}4$

$x+1 = \frac{\log 20{,}4}{\log 8{,}25}$

$x+1 = 1{,}429...$

$\underline{x = 0{,}429...} \quad \rightarrow \quad 8{,}25^{1{,}429} = 20{,}4;$

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

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

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

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

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

$\underline{x = 0{,}352076}$

$\log 2x + \log 6x = \log 108$

$\log 12x^2 = \log 108$

$12x^2 = 108 \quad | : 12$

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

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

$(\frac{36}{49})^{2-x} = \frac{216}{343}$

$(2 - x) \cdot (\log 36 - \log 49) = (\log 216 - \log 343)$

$2 - x = \frac{\log 216 - \log 343}{\log 36 - \log 49}$

$2 - x = 1{,}5 \quad | - 2$

$\underline{-x = -0{,}5;} \quad \underline{+x = +0{,}5} \quad \rightarrow \quad 36^{1,5} = 216; \quad 49^{1,5} = 343;$

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