Polynomdivision – Polynome 4. Grades 2

Man ermittelt die Nullstelle x_1 durch Berechnung.

a) $f(x) = x^4 + x^3 - 4x - 16$ und $f(x) = 0$

b) $g(x) = x^4 - x^3 - 12x^2 - 4x + 16$ und $g(x) = 0$

c) $h(x) = x^4 + x^3 - 51x^2 - 49x + 98$ und $h(x) = 0$

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Lösungen

a) $f(x) = x^4 + x^3 - 4x - 16$ und $f(x) = 0$

$x^4 + x^3 - 4x - 16 = 0$ und $f(-2) = 0$

$(x^4 + x^3 - 4x - 16) : (x + 2) = x^3 - x^2 + 2x - 8$

$-(x^4 + 2x^3)$

$-x^3 - 0x^2$

$-(x^3 - 2x^2)$

$2x^2 - 4x$

$-(2x^2 + 4x)$

$8x - 16$

$-(8x + 16)$

0

$x^2 + x + 4 = 0$ | p,q-Formel

$x_{2,3} = -0{,}5 \pm \sqrt{0{,}25 - 4}$

Radikand negativ, keine weitere Nullstelle

$\boxed{L = \{-2; 2\}}$

b) $g(x) = x^4 - x^3 - 12x^2 - 4x + 16$ und $g(x) = 0$

$x^4 - x^3 - 12x^2 - 4x + 16 = 0$ und $g(1) = 0$

$(x^4 - x^3 - 12x^2 - 4x + 16) : (x - 1) = x^3 - 0x^2 - 12x - 16$

$-(x^4 - x^3)$

$0x^3 - 12x^2$

$-(0x^3 - 0x^2)$

$-12x^2 - 4x$

$-(-12x^2 + 12x)$

$-16x + 16$

$-(-16x + 16)$

0

$(x^3 - 12x - 16) : (x - 4) = x^2 + 4x + 4$

$-(x^3 - 4x^2)$

$4x^2 - 12x$

$-(4x^2 - 16x$

$4x - 16$

$-(4x - 16)$

0

$x^2 + 4x + 4 = 0$ | Binom

$(x + 2)^2 = 0)$

$x_{3,4} = -2$

$\boxed{L = \{-2; 1; 4\}}$

c) $h(x) = x^4 + x^3 - 51x^2 - 49x + 98$ und $h(x) = 0$

$x^4 + x^3 - 51x^2 - 49x + 98 = 0$ und $h(1) = 0$

$(x^4 + x^3 - 51x^2 - 49x + 98) : (x - 1) = x^3 + 2x^2 - 49x - 98$

$-(x^4 - x^3)$

$2x^3 - 51x^2$

$-(2x^3 - 2x^2$

$-49x^2 - 49x$

$-(-49x^2 + 49x)$

$98x + 98$

$-(98x + 98)$

0

$(x^3 + 2x^2 - 49x - 98) : (x + 2) = x^2 + 0x - 49$

$-(x^3 + 2x^2)$

$0x^2 - 49x$

$-(0x^2 + 0x)$

$-49x - 98$

$-(-49x - 98)$

0

$x^2 - 49 = 0$ | Binom

$x_3 = 7$

$x_4 = -7$

$\boxed{L = \{-7; -2; 1; 7\}}$