

Polynomdivision - Polynome 5. Grades 3

Man ermittelt die Nullstelle x_1 durch Berechnung.

a) $f(x) = x^5 + 3x^4 - 11x^3 - 27x^2 + 10x + 24$ und $f(x) = 0$

b) $g(x) = x^5 - 7x^4 - 13x^3 - 91x^2 + 36x - 252$ und $g(x) = 0$

This image shows a full page of blank graph paper. The grid consists of small, equal-sized squares formed by thin gray lines. There are 20 columns and 20 rows of squares, creating a total of 400 square units. The grid covers the entire area of the page, leaving no margins or additional markings.

Polynomdivision - Polynome 5. Grades 3

Lösungen

c) $f(x) = x^5 + 3x^4 - 11x^3 - 27x^2 + 10x + 24$ und $f(x) = 0$

$x^5 + 3x^4 - 11x^3 - 27x^2 + 10x + 24 = 0$ und $f(1) = 0$

$$\begin{array}{r}
 (x^5 + 3x^4 - 11x^3 - 27x^2 + 10x + 24) : (x - 1) = x^4 + 4x^3 - 7x^2 - 34x - 24 \\
 \underline{-(x^5 - x^4)} \\
 4x^4 - 11x^3 \\
 \underline{-(4x^4 - 4x^3)} \\
 -7x^3 - 27x^2 \\
 \underline{-(-7x^3 + 7x^2)} \\
 -34x^2 + 10x \\
 \underline{-(-34x^2 + 34x)} \\
 -24x + 24 \\
 \underline{-(-24x + 24)} \\
 0
 \end{array}$$

$f(-1) = 0$

$$\begin{array}{r}
 (x^4 + 4x^3 - 7x^2 - 34x - 24) : (x + 1) = x^3 + 3x^2 - 10x - 24 \\
 \underline{-(x^4 + x^3)} \\
 3x^3 - 7x^2 \\
 \underline{-(3x^3 + 3x^2)} \\
 10x^2 - 34x \\
 \underline{-(10x^2 - 10x)} \\
 -24x - 24 \\
 \underline{-(-24x - 24)} \\
 0
 \end{array}$$

$f(-2) = 0$

$$\begin{array}{r}
 (x^3 + 3x^2 - 10x - 24) : (x + 2) = x^2 + x - 12 \\
 \underline{-(x^3 + 2x^2)} \\
 x^2 - 10x \\
 \underline{-(x^2 + 2x)} \\
 -12x - 24 \\
 \underline{-(-12x - 24)} \\
 0
 \end{array}$$

$x^2 + x - 12 = 0$ | p,q-Formel

$x_{4,5} = -0,5 \pm \sqrt{0,25 + 12}$

$x_4 = -0,5 + 3,5 = 3$

$x_5 = -0,5 - 3,5 = -4$

$L = \{-4; -2; -1; 1; 3\}$

d) $g(x) = x^5 - 7x^4 - 13x^3 - 91x^2 + 36x - 252$ und $g(x) = 0$

$x^5 - 7x^4 - 13x^3 - 91x^2 + 36x - 252 = 0$ und $f(2) = 0$

$(x^5 - 7x^4 - 13x^3 - 91x^2 + 36x - 252) : (x - 2) = x^4 - 5x^3 - 23x^2 + 45x + 126$

$(x^4 - 5x^3 - 23x^2 + 45x + 126) : (x + 2) = x^3 - 7x^2 - 9x + 63$

$(x^3 - 7x^2 - 9x + 63) : (x - 3) = x^2 - 4x - 21$

$x^2 - 4x - 21 = 0$ | p,q-Formel

$x_{4,5} = 2 \pm \sqrt{4 + 21}$

$x_4 = 2 + 5 = 7$

$x_5 = 2 - 5 = -3$

$L = \{-3; -2; 2; 3; 7\}$