

Dersim faktor

$$Q(x) = x^3 - 13x - 12 \quad \rightarrow \lambda_2 = \{-1, \pm 2, \pm 3, \pm 4, \pm 5, \pm 12\}$$

$$Q(1) = 1^3 - 13 \cdot 1 - 12 = 1 - 13 - 12 \neq 0$$

$$Q(-1) = (-1)^3 - 13 \cdot (-1) - 12 = -1 + 13 - 12 = 0$$

$$Q(x) = 1 \cdot x^3 + 0 \cdot x^2 - 13 \cdot x - 12$$

$$\begin{array}{c|cc|c} & 1 & 0 & -13 \\ \hline -1 & 1 & -1 & -12 \\ & \underbrace{1}_{1} & \underbrace{-1}_{-1} & \underbrace{-12}_{0} \end{array}$$

$$(-1) \cdot 1 + 0 = -1$$

$$(-1) \cdot (-1) + (-13) = 1 - 13 = -12$$

$$(-1) \cdot (-12) + (-12) = +12 - 12 = 0$$

$$\begin{aligned} Q(x) &= (x - (-1)) \cdot (1 \cdot x^2 - 1 \cdot x - 12) = (x+1)(x^2 - 4x + 3x - 12) = \\ &= (x+1) \cdot (x(x-4) + 3(x-4)) = (x+1)(x-4)(x+3) \end{aligned}$$

$$T(x) = x^3 + 10x^2 + 31x + 30$$

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$$\begin{aligned} T(x) &= \underbrace{x^3 + 5x^2}_{x^2(x+5)} + \underbrace{5x^2 + 25x}_{5x(x+5)} + \underbrace{25x + 30}_{5(x+5)} = \\ &= x^2(x+5) + 5x(x+5) + 5(x+5) = (x+5) \cdot (x^2 + 5x + 5) = \\ &= (x+5) \cdot (\underbrace{x^2 + 2x}_{x(x+2)} + \underbrace{3x + 5}_{3(x+2)}) = (x+5) \cdot (x(x+2) + 3(x+2)) = \\ &= (x+5)(x+2)(x+3) \end{aligned}$$

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$$\lambda_{30} = \{-1, -2, -3, -5, -10, -15, -30\} - \text{alle negativen Wurzeln sind negativ}$$

$$T(-1) = -1 + 10 - 31 + 30 \neq 0$$

$$\begin{aligned} T(-2) &= (-2)^3 + 10 \cdot (-2)^2 + 31 \cdot (-2) + 30 = \\ &= -8 + 40 - 62 + 30 = 0 \end{aligned}$$

$$\begin{array}{c|cc|c} 1 & 10 & 31 & 30 \\ \hline -2 & 1 & 8 & 15 \\ & \underbrace{1}_{-1} & \underbrace{8}_{-1} & \underbrace{15}_{0} \end{array}$$

$$\begin{cases} T(x) = (x - (-2)) \cdot (1 \cdot x^2 + 3x + 5) = \\ = (x+2) \cdot (x^2 + 3x + 5x + 15) = \\ = (x+2) \cdot [x(x+3) + 5(x+3)] = \\ = (x+2)(x+3)(x+5) \end{cases}$$

$$P(x) = 2x \cdot (2x+1) \cdot (2x^2+x+10) + 16 = (\underline{2x^2+x}) \cdot (\underline{2x^2+x+10}) + 16$$

notam $2x^2+x=t$

$$(2x^2+x) \cdot (2x^2+x+10) + 16 = t \cdot (t+10) + 16 = t^2 + 10t + 16 = \\ = t^2 + 8t + 2t + 16 = t(t+8) + 2(t+8) = (t+8)(t+2)$$

$P(x) = (2x^2+x+8) \cdot (2x^2+x+2) \rightarrow$ nu se mai des. in \mathbb{R} , deoarece:

$$2x^2+x+8=? \quad \Delta = b^2 - 4ac = 1^2 - 4 \cdot 2 \cdot 8 = 1 - 64 = -63 < 0$$

$$2x^2+x+2=? \quad \Delta = b^2 - 4ac = 1^2 - 4 \cdot 2 \cdot 2 = 1 - 16 = -15 < 0$$

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