

$$1) \quad 2 \left(\underbrace{2x}_{\text{blue}} + \underbrace{\frac{y}{2}}_{\text{red}} \right)^5$$

$$\begin{array}{cccccc}
 & & & & & 1 \\
 & & & & & 1 & 1 \\
 & & & & 1 & 2 & 1 \\
 & & 1 & 3 & 3 & 1 \\
 & 1 & 4 & 6 & 4 & 1 \\
 1 & 5 & 10 & 10 & 5 & 1
 \end{array}$$

$$\begin{aligned}
 & 1 (2x)^5 \cancel{\left(-\frac{y}{2}\right)^0} + 5 (2x)^4 \left(-\frac{y}{2}\right)^1 + 10 (2x)^3 \left(-\frac{y}{2}\right)^2 + 10 (2x)^2 \left(-\frac{y}{2}\right)^3 \\
 & \quad + 5 (2x)^1 \left(-\frac{y}{2}\right)^4 + 1 \cancel{(2x)^0} \left(-\frac{y}{2}\right)^5
 \end{aligned}$$

$$\begin{aligned}
 & 32x^5 - 40x^4y + 20x^3y^2 - 5x^2y^3 \\
 & \quad + \frac{5}{8}xy^4 - \frac{y^5}{32}
 \end{aligned}$$

$$64x^5 - 80x^4y + 40x^3y^2 - 10x^2y^3 + \frac{5}{4}xy^4 - \frac{y^5}{16}$$

$$2) \quad \underbrace{[(3i-2)^2]}^2 - 2 \cdot (i+3)^2 \cdot \underbrace{[(1-2i)^2]}^2$$

$$(-12i-5)^2 - 2 \cdot (6i+8) \cdot (-4i-3)^2$$

$$120i - 119 - 4 \cdot (3i+4) (24i-7)$$

$$120i - 119 - 4 \cdot (-72 - 21i + 96i - 28)$$

$$120i - 119 - 4 \cdot (-100 + 75i)$$

$$120i - 119 + 400 - 300i$$

$$-180i + 281$$

$$3) \text{ b) } f(x) = \frac{2}{6+3x} + 3$$

$$\mathbb{D} = \mathbb{R} \setminus \{-2\}$$

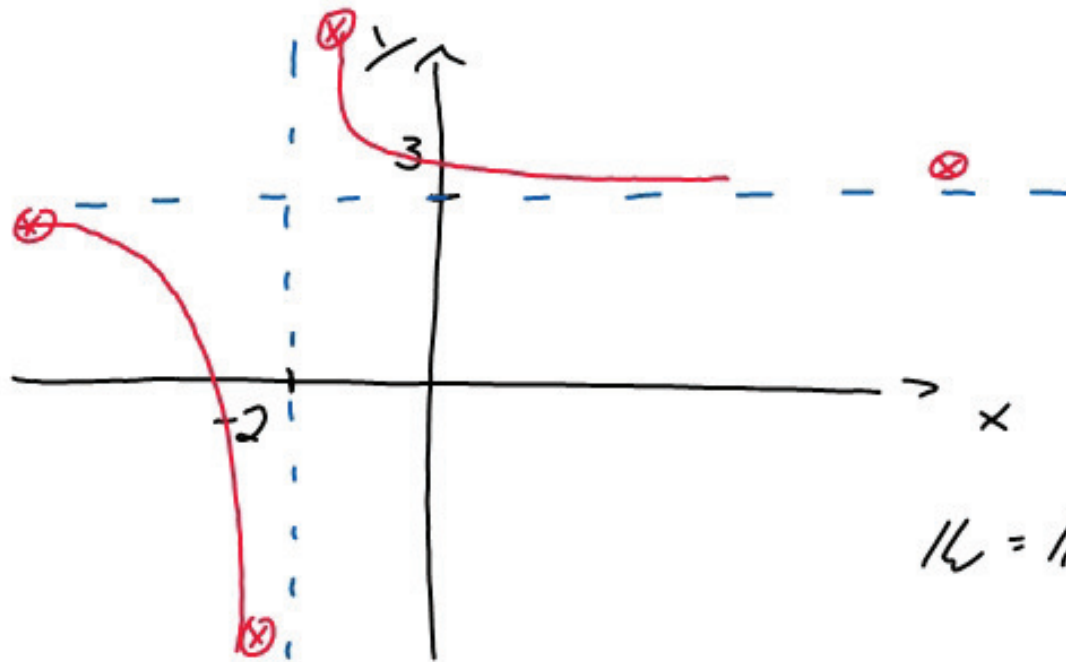


$$\lim_{x \rightarrow -\infty} f(x) = \left[\frac{2}{-\infty} + 3 \right] = [0^- + 3] = 3^-$$

$$\lim_{x \rightarrow \infty} f(x) = \left[\frac{2}{\infty} + 3 \right] = [0^+ + 3] = 3^+$$

$$\lim_{x \rightarrow -2^+} f(x) = \left[\frac{2}{0^+} + 3 \right] = \infty$$

$$\lim_{x \rightarrow -2^-} f(x) = \left[\frac{2}{0^-} + 3 \right] = -\infty$$



$$W = \mathbb{R} \setminus \{3\}$$

4)5)

$$1260 = (2 \cdot 5) \cdot 126 = 2 \cdot 63 = 2 \cdot 3 \cdot 21 = 2 \cdot 3 \cdot 3 \cdot 7 \\ = 2 \cdot 2 \cdot 3 \cdot 3 \cdot 5 \cdot 7$$

$$1350 = (2 \cdot 5) \cdot 135 = 3 \cdot 45 = 3 \cdot 3 \cdot 15 = 3 \cdot 3 \cdot 3 \cdot 5 \\ = 2 \cdot 3 \cdot 3 \cdot 3 \cdot 5 \cdot 5$$

$$1260 = \boxed{2} \cdot \underbrace{2} \cdot \boxed{3} \cdot \boxed{3} \cdot \boxed{5} \cdot \underbrace{7} \cdot 3 \cdot 5$$

$$1350 = \boxed{2} \cdot \boxed{3} \cdot \boxed{3} \cdot \underline{3} \cdot \boxed{5} \cdot \underline{5} \cdot 2 \cdot 7$$

$$\text{ggT} (1260; 1350) = 2 \cdot 3 \cdot 3 \cdot 5 = 90$$

Kürzen

gleiche Pri-faktoren

$$\text{kgV} (1260; 1350) = 1260 \cdot 15 = 18900$$

erweitern

fehlende Zahlen

POLYNOMDIVISION

$$123456 : 7 = 17$$

$$\begin{array}{r} - (71) \\ \hline 53456 \\ - (49) \\ \hline 4456 \end{array}$$

$$M = \{\pm 1; \pm 2; \pm 5; \pm 10\}$$

$$f(x) = x^3 + 2x^2 - 13x + 10 = 0$$

$$(x+a)(x+b)(x+c)$$

$$f(1) = 0 \Rightarrow (x-1)$$

$$(x^3 + 2x^2 - 13x + 10) : (x-1) = x^2 + 3x - 10$$

$$\begin{array}{r} -(x^3 - x^2) \\ \hline / \quad 3x^2 - 13x + 10 \\ -(3x^2 - 3x) \\ \hline / \quad -10x + 10 \\ -(-10x + 10) \\ \hline / \quad \quad \quad \end{array}$$

$$(x-2)(x+5)$$

$$L = \{-5; 2; 1\}$$

$$3) \quad 2x^3 - 22x^2 - 8x + 60 = 0 \quad | :2$$

$$x^3 - 11x^2 - 4x + 30 = 0 \quad f(2) = 0$$

$$(x^3 - 11x^2 - 4x + 30) : (x - 2) = x^2 - 9x - 15$$

$$\begin{array}{r} x^3 - 2x^2 \\ \hline -9x^2 - 4x + 30 \\ -(-9x^2 + 18x) \\ \hline -13x + 30 \\ -(-13x + 26) \\ \hline 4 \end{array}$$

$$(x - 5)(x + 3)$$

$$L = \{ -3; 2; 5 \}$$

$$(x^4 + 3x^3 - 13x^2 - 27x + 36) (x-1) = x^3 \underbrace{(4x^2 - 9x - 36)}_{(x-3)}$$

$$\underline{-(x^4 - x^3)}$$

$$-4x^3 \qquad -36$$

$$\underline{-(4x^3 - 4x^4)}$$

$$-9x^2 - 27x + 36$$

$$\underline{-(-9x^2 + 9x)}$$

$$-36x + 36$$

$$\underline{-36x + 36}$$

$$- \quad -$$

$$(x^3 + 4x^2 - 9x - 36) | (x-3) = x^2 + 7x + 12$$

$$\underline{-(x^3 - 3x^2)}$$

$$7x^2 - 9x - 36$$

$$\underline{-(7x^2 - 21x)}$$

$$12x - 36$$

$$\underline{12x - 36}$$

$$- \quad -$$

$$\Rightarrow (x-1)(x-3)(x+3)(x+4) = 0$$

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