

S 130

$$1.a) \quad x^3 - 4x^2 + 30 = 11x \quad | -11x$$

$$x^3 - 4x^2 - 11x + 30 = 0 \quad M = \{ \pm 1; \pm 2; \pm 3; \dots \}$$

$$x = 1 : 1 - 4 - 11 + 30 = 16 \neq 0$$

$$x = 2 : 8 - 16 - 22 + 30 = 0 \quad \Rightarrow (x-2)$$

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

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

$$/ \quad -2x^2 - 11x + 30$$

$$- \quad (-2x + 4x)$$

$$/ \quad -15x + 30$$

$$- \quad (-15x + 30)$$

$$/ \quad -$$

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

$$\Rightarrow (x-2)(x-5)(x+3) = 0$$

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

$$1.5) \quad x^4 - 2x^2(3x+8) + 54x + 63 = 0$$

$$x^4 - 6x^3 - 16x^2 + 54x + 63 = 0 \quad M = \{\pm 1; \pm 3; \pm 7 \dots\}$$

$$x = 1 : 1 - 6 - 16 + 54 + 63 \neq 0$$

$$x = -1 : 1 + 6 - 16 - 54 + 63 = 0 \quad \Rightarrow (x+1)$$

$$(x^4 - 6x^3 - 16x^2 + 54x + 63) \cdot \underline{(x+1)} = x^3 - 7x^2 - 9x + 63$$

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

$$-7x^3 - 16x^2 + 54x + 63$$

$$\underline{-(-7x^3 - 7x^2)}$$

$$-9x^2 + 54x + 63$$

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

$$63x + 63$$

$$\underline{-(63x + 63)}$$

— —

$$x = 3 : 27 - 63 - 27 + 36 = 0$$

$$\Rightarrow (x-3)$$

$$(x^3 - 7x^2 - 9x + 63) \cdot \underline{(x-3)} = x^2 - 4x - 21$$

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

$$-4x^2 - 9x + 63$$

$$\underline{-(-4x^2 + 12x)}$$

$$-21x + 63$$

$$\underline{-(-21x + 63)}$$

$$\underline{(x-7)(x+3)}$$

$$\Rightarrow \underline{(x+1)} \cdot \underline{(x-3)} \cdot \underline{(x-7)} \cdot \underline{(x+3)} = 0$$

$$L = \{-3; -1; 3; 7\}$$

$$2.a) \quad \frac{\frac{2}{9} + \frac{4}{15}}{\frac{4}{3} - \frac{7}{10}} = \frac{\frac{10+12}{45}}{\frac{40-21}{30}} = \frac{\frac{22}{45}}{\frac{19}{30}} = \frac{22}{45} \cdot \frac{30}{19} = \frac{44}{57}$$

$$b) \quad \frac{\frac{3x}{4y} - \frac{5}{3z}}{\frac{5x}{6yz} + \frac{3z}{2x}} = \frac{\frac{9xz - 20y}{12yz}}{\frac{5x^2 + 9yz^2}{6xyz}} = \frac{9xz - 20y}{12yz} \cdot \frac{6xyz}{5x^2 + 9yz^2} = \frac{9x^2z - 20xy}{10x^2 + 18yz^2}$$

$$c) \quad \frac{\frac{a}{3} + 2 + \frac{3}{a}}{\frac{1}{6} + \frac{1}{24}} = \frac{\frac{a^2 + 6a + 9}{3a}}{\frac{a+3}{6a}} = \frac{(a+3)^2}{3a} \cdot \frac{6a}{a+3} = (a+3) \cdot 2 = 2a + 6$$

$$3.a) \quad \frac{2}{5x} - \frac{3}{4} + \frac{5}{12} - \frac{7}{6} = \frac{4}{15x} - \frac{9}{10} \quad | \cdot \text{HN} : 60x$$

$$12 \cdot 2 - 15x \cdot 3 + 5x \cdot 5 - 10x \cdot 7 = 4 \cdot 4 - 6x \cdot 9$$

$$24 - 45x + 25x - 70x = 16 - 54x \quad | +54x - 24$$

$$-36x = -8 \quad | :(-36)$$

$$x = \frac{-8}{-36} = \frac{2}{9} = 0,\bar{2}$$

$$\frac{\sqrt[3]{x^2} \cdot \sqrt{x^3} \cdot \sqrt[4]{x^5}}{\sqrt[3]{x^4}} = \frac{x^{2/3} \cdot x^{3/2} \cdot x^{5/4}}{\underbrace{((x^4)^{1/3})^{1/2}}_{x^{2/3}}} = x^{\frac{2}{3} + \frac{3}{2} + \frac{5}{4} - \frac{2}{3}} = x^{11/4}$$

$\swarrow$   
 $\sqrt[4]{x^{11}}$

$$\frac{(5 \cdot a^{-2} b^3 c^{-1})^3}{(0,2 a^{-3} b^2 c^{-2})^{-4}} = \frac{5^3 a^{-6} b^9 c^{-3}}{5^4 a^{12} b^{-8} c^8} = \frac{5^3 b^9 b^8}{5^4 a^6 c^3 a^{12} c^8}$$

$\downarrow$   
 $\frac{1}{5} = 5^{-1}$

$$= \frac{b^{17}}{5 a^{18} c^{11}} = \frac{1}{5} \cdot a^{-18} b^{17} c^{-11}$$

S 134

$$1) (x^3(x^6(x^2)^{1/3})^{1/4})^{1/2} = x^{3/2} \cdot x^{6 \cdot 1/4 \cdot 1/2} \cdot x^{2 \cdot 1/3 \cdot 1/4 \cdot 1/2} \\ = x^{3/2} \cdot x^{3/4} \cdot x^{1/12} = x^{\frac{18+9+1}{12}} = x^{28/12} = x^{7/3}$$

$$2) \frac{(8k^2 \cdot v^{-2} w)^4}{(81 r^{-3} s^2 t^3)^2} \cdot \frac{(3^4 r^{-3} s^4 t^3)^2}{(2^4 k^3 v^{-4} w^{-2})^3} = \frac{2^{12} 8^8 v^{-8} w^4 3^8 r^{-6} s^8 t^6}{3^8 r^{-6} s^{-4} t^6 2^8 k^9 v^{-12} w^{-6}} \cdot \frac{3^8 r^{-6} s^8 t^6}{2^8 k^9 v^{-12} w^{-6}}$$

$$\frac{2^{12} 3^8}{2^{12} 3^8} \frac{k^8 w^4 s^8 t^6 r^6 s^4 v^{12} w^6}{v^8 r^6 t^6 k^9} = \frac{w^{10} s^{12} v^4}{k} = k^{-1} v^4 w^{10} s^{12}$$

$$3) \frac{k \sqrt{a^{2-k}}}{(k \sqrt{a})^{3k+4}} \cdot \left[ \frac{k \sqrt{a}}{(k \sqrt{a^2})^{k+3}} \right]^{-2} = \frac{a^{\frac{2-k}{k}}}{a^{\frac{3k+4}{k}}} \cdot \frac{a^{-2/k}}{a^{\frac{-4k-12}{k}}}$$

$$a^{\frac{(2-k) + (-2) - (3k+4) - (-4k-12)}{k}} = a^{\frac{8}{k}} = k \sqrt[k]{a^8}$$

$f(x) \rightarrow y$ -Koordinate

$f'(x) \rightarrow$  Steigung

$f''(x) \rightarrow$  Krümmung

