

S 130

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

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

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

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

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

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

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

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

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

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

$$/ \quad -$$

$$\underbrace{\hspace{10em}}$$

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

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

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

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

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

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

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

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

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

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

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

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

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

$$63x + 63$$

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

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

$$\Rightarrow (x-3)$$

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

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

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

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

$$-21x + 63$$

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

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

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

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

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

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

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

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

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

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

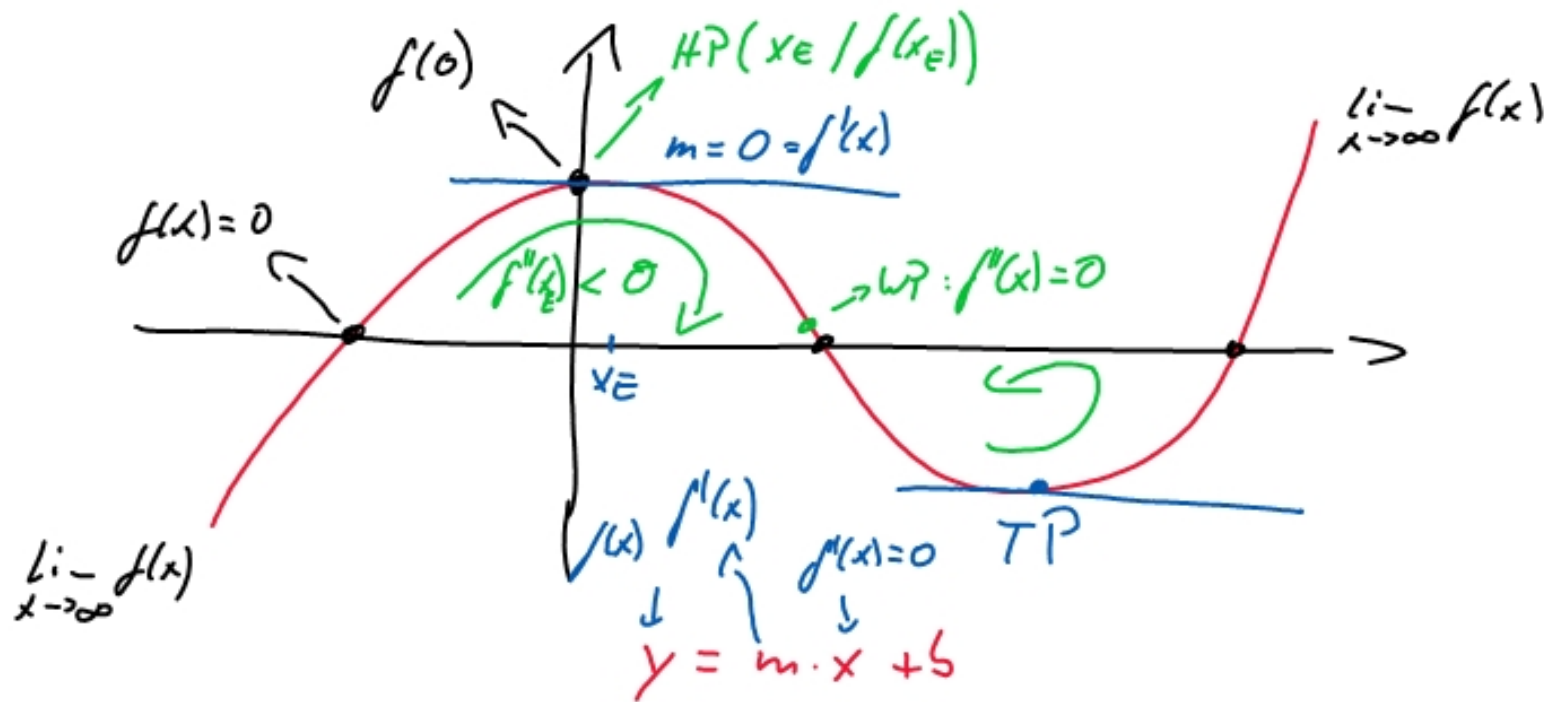
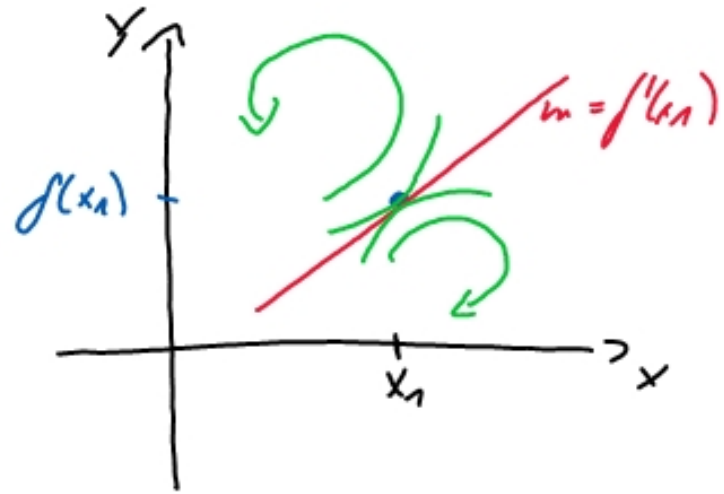
$$-36x = -8 \quad | :(-36)$$

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

$f(x) \rightarrow y$ -Koordinate

$f'(x) \rightarrow m$ - Steigung

$f''(x) \rightarrow$ Krümmung



$$I \quad \frac{3\sqrt{\sqrt{x^5}} \cdot (3\sqrt{x^2})^2 \cdot \sqrt{\sqrt{x^3}}}{4\sqrt{(x^3)^2}} = \frac{((x^5)^{1/2})^{1/3} (x^2)^{1/3} (x^3)^{1/2}}{((x^3)^2)^{1/4}}$$

$$\frac{x^{5/6} \cdot x^{4/3} \cdot x^{3/4}}{x^{3/2}} = x^{5/6 + 4/3 + 3/4 - 3/2} = x^{10/12 + 16/12 + 9/12 - 18/12} = x^{17/12} = 12\sqrt{x^{17}}$$

$$II \quad \frac{(16 \cdot x^{-3} \cdot y^2 \cdot z^4)^{-2}}{(0,25 x^2 y^{-3} z^2)^{-3}} = \frac{2^{-8} x^6 y^{-4} z^{-8}}{2^6 x^{-6} y^9 z^{-6}} = \frac{x^6 y^6 z^6}{2^8 y^4 z^8 2^6 y^9} = \frac{x^{12}}{2^{14} z^2 y^{13}}$$

$2^4 \uparrow$
 $\downarrow 2^{-2}$

S 134

$$1) \left(x^3 \left(x^6 \left(x^2 \right)^{1/3} \right)^{1/4} \right)^{1/2} = x^{3/2} \cdot x^{6 \cdot 1/4 \cdot 1/2} \cdot x^{2 \cdot 1/3 \cdot 1/4 \cdot 1/2}$$

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

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

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

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

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

$$4) \sqrt{\frac{y^{-2}(x \cdot z^3)^5}{x^{-3}y^4z^7}} = \left(\frac{y^{-2}x^5z^{15}}{x^{-3}y^4z^7} \right)^{\frac{1}{2}} = \left(\frac{x^8z^8}{y^6} \right)^{\frac{1}{2}} = x^4 \cdot z^4 \cdot y^{-3}$$

$$5) \frac{(5a^5c^2)^3}{(2^3x^2y^0)^{-2}} \cdot \frac{(5^2xy^{-3})^{-2}}{(4^{-1}a^{-2}5^0c^3)^2} = \frac{5^3a^3c^6}{2^6x^{-4}} \cdot \frac{5^{-4}x^{-2}y^6}{2^{-4}a^{-4}c^6}$$

$$\frac{5^3a^3c^6y^6x^4}{5^4x^6a^9x^2a^4c^6} = \frac{1}{20} \cdot \frac{x^2y^6}{a^5c}$$

$$6) \left[\frac{2x\sqrt{3x-2}}{2x\sqrt{4x-4}} \cdot \left(2x\sqrt{h} \right)^{5x-2} \right]^3 = \left(\frac{h^{\frac{3x-2}{2x}}}{h^{\frac{4x-4}{2x}}} \cdot h^{\frac{5x-2}{2x}} \right)^3$$

$$h^{\frac{3[(3x-2)+5x-2]-(4x-4)}{2x}} = h^{\frac{12x}{2x}} = h^6$$