S 130

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

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

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

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

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

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

$-2x^2 - 11x + 30$

$-(-2x + 4x)$

$-15x + 30$

$-(-15x + 30)$

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

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

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

1. 5) $x^4 - 2x^2(3x+8) + 54x + 63 = 0$

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

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

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

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

$-(x^4 + x^3)$

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

$-(-7x^3 - 7x^2)$

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

$-(-9x^2 - 9x)$

$63x + 63$

$-(63x + 63)$

0

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

$\Rightarrow (x-3)$

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

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

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

$-(-4x^2 + 12x)$

$-21x + 63$

$-(-21x + 63)$

0

$(x-7)(x+3)$

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

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

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

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

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

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

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

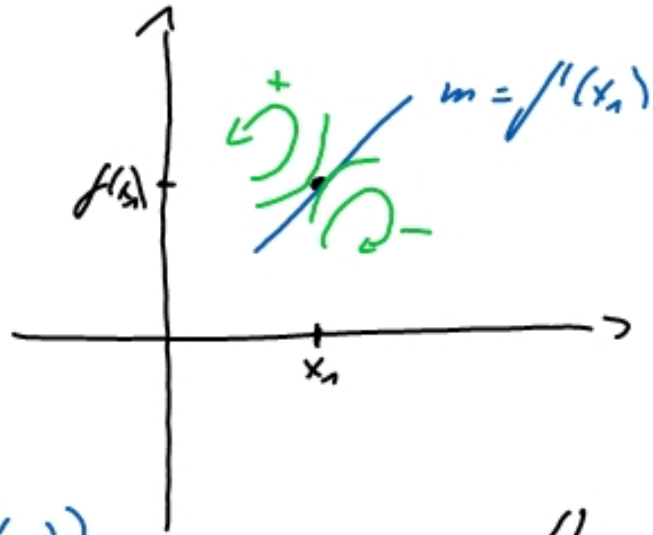
$$-36x = -8 \quad | :(-36)$$

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

$f(x)$: y - Koordinate

$f'(x) = m$ Steigung

$f''(x)$ => Krümmung



$y = m \cdot x + b$

$\uparrow$

$f''(W) = 0$

$(x_E \mid f(x_E))$

$f(0)$

HP $m = 0 : f'(x) = 0$

$f(W) = 0$

$f''(x_E) < 0$

$f''(x_W) = 0$

x_E

x_W

TP

$\lim_{x \to \infty} f(x)$

$\lim_{x \to -\infty} f(x)$

$$\frac{\sqrt[3]{\sqrt{x^3}} \cdot \sqrt[5]{x^2} \cdot \sqrt{\sqrt{x^5}}}{\sqrt[3]{\sqrt[4]{x^7}}} = \frac{\left((x^3)^{1/2}\right)^{1/3} \cdot x^{2/5} \cdot \left((x^5)^{1/2}\right)^{1/2}}{\left((x^7)^{1/4}\right)^{1/3}}$$

$$\frac{x^{1/2} \cdot x^{2/5} \cdot x^{3/4}}{x^{1/16}} = x^{1/2 + 2/5 + 5/4 - 1/16} = x^{\frac{30+24+75-10}{60}} = x^{119/60}$$

$$= \sqrt[60]{x^{119}}$$

$$\frac{\left(8^{-2^3} \cdot x^2 \cdot y^{-3} \cdot z^5\right)^{-2}}{\left(0{,}25 \cdot x^{-3} y^2 z^2\right)^3} = \frac{2^{-6} x^{-4} y^6 z^{-10}}{2^{-6} x^{-9} y^6 z^6}$$

$$0{,}25 = \frac{1}{2^{-2}}$$

$$= \frac{y^6 x^9}{x^4 z^{10} y^6 z^6} = \frac{x^5}{z^{16}} = x^5 \cdot z^{-16}$$

S 134

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

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

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

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

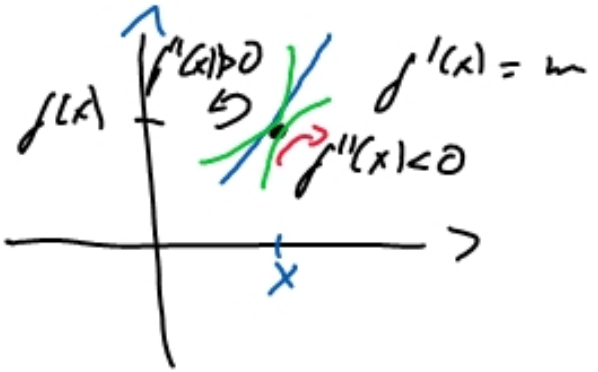
3) $\dfrac{\sqrt[k]{a^{2-k}}}{\left(\sqrt[k]{a}\right)^{3k+4}} \cdot \left[\dfrac{\sqrt[k]{a}}{\left(\sqrt[k]{a^2}\right)^{k+3}} \right]^{-2} = \dfrac{a^{\frac{2-k}{k}}}{a^{\frac{3k+4}{k}}} \cdot \dfrac{a^{-2/k}}{a^{\frac{-4k-12}{k}}}$

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

$f(x)$ → y - Koordinate

$f'(x)$ → Steigung

$f''(x)$ → Krümmung



2 3 1.

$y = m \cdot x + c$