$$z^3 + (6-2i)\cdot z^2 = 2i\cdot z\cdot(3-4i)$$

$$z^3 + (6-2i)\cdot z^2 - z\cdot(8+6i) = 0$$

Nullform

$$z\cdot\left(z^2 + (6-2i)\cdot z - (8+6i)\right) = 0$$

$$z_1 = 0$$

$$x^2 + px + q = 0 \quad\Rightarrow\quad x_{1/2} = -\frac{p}{2} \pm \sqrt{\left(\frac{p}{2}\right)^2 - q}$$

$$z_{2/3} = -\frac{6-2i}{2} \pm \sqrt{\left(\frac{6-2i}{2}\right)^2 + (8+6i)}$$

$$= -3 + i \pm \sqrt{(3-i)^2 + 8 + 6i}$$

$$= -3 + i \pm \sqrt{9 \underline{-6i} - 1 + 8 \underline{+6i}}$$

$$= -3 + i \pm \sqrt{16}$$

$$z_2 = -7 + i$$

$$z_3 = 1 + i$$

$$z^2 - (6i-4)\cdot z = 12i + 9 \qquad \big| -(12i+9)$$

$$z^2 - (6i-4)\cdot z - (12i+9) = 0$$

$$z_{1/2} = 3i - 2 \pm \sqrt{(3i-2)^2 + 12i + 9}$$

$$= 3i - 2 \pm \sqrt{-9 \underline{-12i} + 4 \underline{+12i} + 9}$$

$$= 3i - 2 \pm \sqrt{4}$$

$$z_1 = 3i$$

$$z_2 = 3i - 4$$

1) $$\frac{3a+4}{2\sqrt{a-2}+3\sqrt{5-2a}} \cdot \frac{2\sqrt{a-2}-3\sqrt{5-2a}}{2\sqrt{a-2}-3\sqrt{5-2a}}$$

$$\frac{(3a+4)\left(2\sqrt{a-2}-3\sqrt{5-2a}\right)}{4(a-2)-9\cdot(5-2a)}$$

$$\frac{(3a+4)\left(2\sqrt{a-2}-3\cdot\sqrt{5-2a}\right)}{22a-53}$$

4) $$\left(\frac{4ab}{c}+\frac{c}{2b}\right)^4$$

$$1\left(\frac{4ab}{c}\right)^4 + 4\left(\frac{4ab}{c}\right)^3\left(\frac{c}{2b}\right)^1 + 6\left(\frac{4ab}{c}\right)^2\left(\frac{c}{2b}\right)^2 + 4\left(\frac{4ab}{c}\right)^1\left(\frac{c}{2b}\right)^3 + 1\left(\frac{c}{2b}\right)^4$$

$$256\,\frac{a^4b^4}{c^4} + 128\,\frac{a^3b^2}{c^2} + 24\,a^2 + 2\,\frac{ac^2}{b^2} + \frac{c^4}{16b^4}$$

Polynomdivision

$$12345 : 7 = 17$$

$$-7$$

$$5345$$

$$-49$$

$$445$$

$$(3ax - 4ay + 35x - 45y) : (a+5) = 3x - 4y$$

$$-(3ax + 35x)$$

$$/ \quad / \quad -4ay - 45y$$

$$-(-4ay - 45y)$$

$$/ \quad /$$

$$(x^3 - 2x^2 + 4x - 5) : (x+2) = x^2 - 4x + 12 - \frac{29}{x+2}$$

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

$$/ \quad -4x^2 + 4x - 5$$

$$-(-4x^2 - 8x)$$

$$/ \quad 12x - 5$$

$$-(12x + 24)$$

$$/ \quad -29$$

b) $(6u^2 - 4u^2v + 5uv + 2uv^2 - 4v^2) : (2u - v) = \underline{3u - 2uv + 4v}$

$-(6u^2 \qquad - 3uv)$

$\overline{\quad / \quad -4u^2v + 8uv + 2uv^2 - 4v^2}$

$-(-4u^2v \qquad + 2uv^2)$

$\overline{\quad / \quad 8uv \quad / \quad -4v^2}$

$-(8uv \qquad -4v^2)$

$\overline{\quad - \qquad - \quad}$

0xy

c) $(18x^2 - 15x^2y + 10xy^2 - 8y^2)\ (3x - 2y) = \underline{6x - 5xy + 4y}$

$-(18x^2 \quad - 12xy)$

$\overline{\quad -15x^2y + 12xy + 10xy^2 - 8y^2}$

$-(-15x^2y \qquad + 10xy^2)$

$\overline{\quad / \quad 12xy \quad / \quad -8y^2}$

$(12xy \qquad -8y^2)$

$\overline{\quad - \qquad - \quad}$

d) $(4x^2 - 3x^2y + 3xy^2 - 4xy + 5xz - 3xyz - yz + z^2)(x - y + z) = 4x - 3xy + z$

$-(4x^2 \qquad -4xy + 4xz)$

$-3x^2y + 3xy^2 + xz - 3xyz - yz + z^2$

$-(-3x^2y + 3xy^2 \qquad -3xyz)$

$xz \qquad -yz + z^2$

$-(xz \qquad -yz + z^2)$

$$f(x) = x^3 - 3x^2 - 10x + 24 = 0$$

$\hookrightarrow M = \{\pm 1; \pm 2; \pm 3; \pm 4; \pm 6; \pm 8; \pm 12; \pm 24\}$

$x = 2: \quad 8 - 12 - 20 + 24 = 0 \quad \Rightarrow \quad (x-2)$

$$(x^3 - 3x^2 - 10x + 24) : (x-2) = \underbrace{x^2 - x - 12}_{(x-4)(x+3)}$$

$$\begin{array}{l}
-(x^3 - 2x^2) \\
\hline
/ \quad -x^2 - 10x + 24 \\
\quad -(-x^2 + 2x) \\
\hline
\quad / \quad -12x + 24 \\
\quad\quad -(-12x + 24) \\
\hline
\quad\quad - \quad -
\end{array}$$

$$f(x) = (x-2) \cdot (x-4)(x+3)$$

$$L = \{-3; 2; 4\}$$

$$\left.\begin{aligned} &1)\ f(x) = x^3 - 3x^2 - x + 3 \\ &2)\ g(x) = x^4 - x^3 - 7x^2 + x + 6 \end{aligned}\right\} \underline{\text{Nullstellen}}$$

$$\begin{aligned} g(x) &= (x+2) \cdot f(x) \\ &= (x+2)(x-3) \cdot (x^2-1) \\ &= (x+2)(x-3) \cdot (x+1)(x-1) \end{aligned}$$

$$\mathbb{L} = \{-2; -1; 1; 3\}$$

3) a) $$3 - \frac{2x+3y}{x+y} - \frac{\overbrace{x^2-y^2}^{(x+y)(x-y)}}{(x+y)^2} = \frac{3\cdot(x+y)-(2x+3y)-(x-y)}{x+y}$$

$$= \frac{3x+3y-2x-3y-x+y}{x+y} = \frac{y}{x+y}$$

$$\frac{xy+y^2}{(x+y)^2}$$

$$\frac{3\cdot(x+y)^2}{(x+y)^2} - \frac{(2x+3y)\cdot(x+y)}{(x+y)^2} - \frac{x^2-y^2}{(x+y)^2}$$

$$\frac{3x^2+6xy+3y^2-[2x^2+2xy+3xy+3y^2]-(x^2-y^2)}{(x+y)^2}$$

$$\frac{3x^2+6xy+3y^2-2x^2-5xy-3y^2-x^2+y^2}{(x+y)^2}$$

$$\frac{xy+y^2}{(x+y)^2} = \frac{y(x+y)}{(x+y)^2}$$

5)
$$\frac{-\frac{0{,}5}{5}-\frac{1}{2xy}}{\frac{xy}{5}+\frac{2}{1}+\frac{5}{xy}} = \frac{\frac{-xy-5}{10xy}}{\frac{x^2y^2+10xy+25}{5xy}}$$

$$-\frac{(xy+5)}{10xy}\cdot\frac{5xy}{(xy)^2+10xy+5^2} = -\frac{(xy+5)}{2}\cdot\frac{1}{(xy+5)^2}$$

$$= \frac{-1}{2xy+10}$$

d) $\dfrac{2u(u-v)}{u^2-v^2} - \dfrac{4}{3} + \dfrac{1}{u} = \dfrac{6u^2 - 4u(u+v) + 3\cdot(u+v)}{3u(u+v)}$

$(u+v)(u-v)$

$\dfrac{2u^2 - 4uv + 3u + 3v}{3u(u+v)}$

5) $\dfrac{\frac{a}{3} + 2 + \frac{3}{a}}{\frac{1}{6} + \frac{1}{2a}} = \dfrac{\frac{a^2 + 6a + 9}{3a}}{\frac{a+3}{6a}}$

$\dfrac{(a+3)^2}{3a} \cdot \dfrac{6a}{a+3} = 2a+6$

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

$$\frac{\frac{3x}{4y}-\frac{5}{3z}}{\frac{5x}{6y^2}+\frac{3z}{2x}} = \frac{\frac{9xz-20zy}{12yz}}{\frac{5x^2+9yz^2}{6xyz}}$$

$$= \frac{9xz-20yz}{\overset{}{\underset{2}{\cancel{12}}}\,\cancel{yz}}\cdot\frac{\overset{1}{\cancel{6}}\,x\cancel{yz}}{5x^2+9yz^2} = \frac{9x^2z-20xyz}{10x^2+18yz^2}$$

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

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

$$24 - 45x + 25x - 70x = 16 - 54x$$

$$24 - 90x = 16 - 54x \quad \Leftrightarrow \quad 8 = 36x \qquad x = \frac{8}{36} = \frac{4}{18} = 2/9$$

1) $\sqrt{x^3 \sqrt[4]{x^6 \sqrt[3]{x^2}}}$

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

$$x^{3\cdot 1/2} \cdot x^{6\cdot 1/4 \cdot 1/2} \quad x^{2\cdot 1/3 \cdot 1/4 \cdot 1/2}$$

$$x^{3/2} \cdot x^{3/4} \cdot x^{1/12} = x^{3/2 + 3/4 + 1/12}$$

$$= x^{\frac{18+9+1}{12}}$$

$$= x^{28/12} = x^{7/3} = \sqrt[3]{x^7}$$

$$\frac{\left(2^{3}u^{2}v^{-2}w\right)^{4}}{\left(3^{4}r^{-3}s^{-2}t^{3}\right)^{2}}\cdot\frac{\left(2^{4}u^{3}v^{-4}w^{-2}\right)^{-3}}{\left(3^{4}r^{-3}s^{4}t^{3}\right)^{-2}}$$

Potenzen rein-multiplizieren

$$\frac{2^{12}u^{8}v^{-8}w^{4}\,2^{-12}u^{-9}v^{12}w^{6}}{3^{8}r^{-6}s^{-4}t^{6}\,3^{-8}r^{6}s^{-8}t^{-6}}$$

positive Exp

Sortieren

$$\frac{2^{12}\,3^{8}\,u^{8}w^{4}v^{12}w^{6}r^{6}s^{4}s^{8}t^{6}}{2^{12}\,3^{8}\,v^{8}u^{9}t^{6}r^{6}}$$

Vielfache Kürzen

$$\frac{w^{10}v^{4}s^{12}}{u}$$

$$u^{-1}v^{4}w^{10}s^{12}$$

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

$$\frac{a^{\frac{2-k}{k}}}{a^{\frac{3k+4}{k}}} \cdot \frac{a^{\frac{4k+12}{k}}}{a^{\frac{2}{k}}}$$

$$a^{\frac{2-k-(3k+4)+4k+12-2}{k}}$$

$$a^{\frac{8}{k}} = \sqrt[k]{a^{8}}$$