

Lösung

1. a) $(3x - 5y)^2 = 9x^2 - 30xy + 25y^2$

b) $\frac{2}{3} \cdot (6a - 1,5b)^2 = \frac{2}{3} \cdot (36a^2 - 18ab + 2,25b^2) = 24a^2 - 12ab + 1,5b^2$

c) $(0,5x - y)^2 - (0,5x - y) \cdot (0,5x + y) = 0,25x^2 - xy + y^2 - (0,25x^2 - y^2) =$
 $= 0,25x^2 - xy + y^2 - 0,25x^2 + y^2 = 2y^2 - xy$

d) $\left(\frac{1}{3}x - 3\right)^2 + \frac{1}{3} \cdot (x+2)^2 = \frac{1}{9}x^2 - 2x + 9 + \frac{1}{3} \cdot (x^2 + 4x + 4) =$
 $= \frac{1}{9}x^2 - 2x + 9 + \frac{1}{3}x^2 + \frac{4}{3}x + \frac{4}{3} = \frac{4}{9}x^2 - \frac{2}{3}x + \frac{31}{3}$

e) $(2x - 3)^2 - 2 \cdot (x + 3)^2 - \frac{1}{2} \cdot (6 - 2x)^2 =$
 $= 4x^2 - 12x + 9 - 2 \cdot (x^2 + 6x + 9) - \frac{1}{2} \cdot (36 - 24x + 4x^2) =$
 $= 4x^2 - 12x + 9 - 2x^2 - 12x - 18 - 18 + 12x - 2x^2 = -27 - 12x$

2. a) $36x^2 - 25 = (6x + 5) \cdot (6x - 5)$

b) $36x^2 - 60x + 25 = (6x - 5)^2$

c) $2x^2 - 8x + 8 = 2 \cdot (x^2 - 4x + 4) = 2 \cdot (x - 2)^2$

d) $2x^2 - 12,5 = 2 \cdot (x^2 - 6,25) = 2 \cdot (x + 2,5) \cdot (x - 2,5)$

3. a) $\frac{4x^2 - 4x + 1}{4x - 2} = \frac{(2x - 1)^2}{2 \cdot (2x - 1)} = \frac{2x - 1}{2}$ und $D = \mathbb{R} \setminus \{\frac{1}{2}\}$

b) $\frac{2x^2 - 2}{x^2 + 2x + 1} = \frac{2 \cdot (x^2 - 1)}{(x + 1)^2} = \frac{2 \cdot (x + 1) \cdot (x - 1)}{(x + 1)^2} = \frac{2 \cdot (x - 1)}{x + 1} = \frac{2x - 2}{x + 1}$ und $D = \mathbb{R} \setminus \{-1\}$

c) $\frac{x^2 - x}{x^3 - x^2} = \frac{x \cdot (x - 1)}{x^2 \cdot (x - 1)} = \frac{1}{x}$ und $D = \mathbb{R} \setminus \{0; 1\}$

d) $\frac{x^3 - 12x^2 + 18x}{x^2 - 9} = \frac{x \cdot (x^2 - 12x + 18)}{(x + 3) \cdot (x - 3)}$ und $D = \mathbb{R} \setminus \{-3; 3\}$

Rechnen mit Quadratwurzeln

$$1. a) -2\sqrt{48} - \frac{2}{3}\sqrt{32} - \sqrt{0,12} + \sqrt{\frac{2}{9}} = -8\sqrt{3} - \frac{8}{3}\sqrt{2} - \frac{2}{10}\sqrt{3} + \frac{1}{3}\sqrt{2} =$$

$$= -8,2\sqrt{3} - \frac{7}{3}\sqrt{2}$$

$$b) \sqrt{6} \cdot (2\sqrt{3} - 3\sqrt{2}) = 6\sqrt{2} - 6\sqrt{3}$$

$$c) \sqrt{8} \cdot (3\sqrt{2a} + 5\sqrt{18a}) = 12\sqrt{a} + 60\sqrt{a} = 72\sqrt{a}$$

$$d) (\sqrt{3} - 3\sqrt{6})^2 - (\sqrt{2} - 1)^2 = 3 + 18\sqrt{2} + 54 - (2 - 2\sqrt{2} + 1) = 54 + 20\sqrt{2}$$

$$2. a) \frac{\sqrt{3} - \sqrt{5}}{\sqrt{30}} = \frac{3\sqrt{10} - 5\sqrt{6}}{30}$$

$$b) \frac{3 - \sqrt{2}}{\sqrt{2} + 3} = \frac{(3 - \sqrt{2}) \cdot (\sqrt{2} - 3)}{2 - 9} = \frac{3\sqrt{2} - 9 - 2 + 3\sqrt{2}}{-7} = \frac{11 - 6\sqrt{2}}{7}$$

$$c) \frac{3\sqrt{5} - 5\sqrt{3}}{3 + \sqrt{5}} = \frac{(3\sqrt{5} - 5\sqrt{3}) \cdot (3 - \sqrt{5})}{4} = \frac{9\sqrt{5} - 15 - 15\sqrt{3} + 5\sqrt{15}}{4}$$

$$d) \frac{\sqrt{3}}{\sqrt{5} - \sqrt{3}} - \frac{\sqrt{5} - \sqrt{3}}{\sqrt{3}} = \frac{\sqrt{15} + 3}{2} - \frac{\sqrt{15} - 3}{3} = \frac{3\sqrt{15} + 9}{6} - \frac{2\sqrt{15} - 6}{6} = \frac{\sqrt{15} + 15}{6}$$

$$4. a) \sqrt{x^2 - 4x + 4} = 2 - x$$

$$b) \sqrt{\frac{8x^4 + 4}{18x^3}} = \frac{2}{3x} \sqrt{\frac{2x^4 + 1}{2x}}$$

Wurzelterme

$$1. a) D = [0; \infty[$$

$$b) D =]-\infty; 2]$$

$$c) D = [-\frac{1}{2}; \infty[$$

$$e) D = [0; 4[\cup]4; \infty[$$
