

TBM IE, 21.11.13

① a)  $-y^2 \cdot (-y)^2 = -y^2 \cdot y^2 = \underline{\underline{-y^4}}$

b)  $-\left((-x)^2\right)^3 = -(x^2)^3 = \underline{\underline{-x^6}}$

② a)  $\frac{2}{x} + \frac{3}{y} = \underline{\underline{\frac{-3x+2y}{xy}}}$

b)  $\frac{5}{x-y} - \frac{5x+y}{x^2-y^2} = \frac{5}{x-y} - \frac{5x+y}{(x+y)(x-y)}$   
 $= \frac{5(x+y) - (5x+y)}{(x+y)(x-y)} = \underline{\underline{\frac{4y}{(x+y)(x-y)}}}$

c)  $\frac{1}{(x+1)^2} - \frac{1}{(x+1)(x-1)} = \frac{x-1 - (x+1)}{(x+1)^2(x-1)}$   
 $= \underline{\underline{\frac{2}{(x+1)^2(x-1)}}}$

d)  $\frac{b}{b(a+b)} - \frac{ab}{a(a-b)} + \frac{b}{a-b} =$   
 $\frac{1}{a+b} - \frac{b}{a-b} + \frac{b}{a-b} = \underline{\underline{\frac{1}{a+b}}}$

$$\textcircled{3} \text{ a) } \frac{x}{3} = 2 + \frac{x}{5} \quad | \cdot 15 \quad \mathbb{D} = \mathbb{R}$$

$$5x = 30 + 3x \quad | -3x$$

$$2x = 30$$

$$\underline{\underline{x = 15}}$$

$$\text{b) } \frac{10+x}{12x} - \frac{-5x+4}{6x} = 1 - \frac{x+3}{4x} \quad | \cdot 12x$$

$$10+x - 2(-5x+4) = 12x - 3(x+3)$$

$$10+x + 10x - 8 = 12x - 3x - 9$$

$$11x + 2 = 9x - 9$$

$$2x = -11$$

$$\underline{\underline{x = -\frac{11}{2}}}$$

$$\mathbb{D} = \mathbb{R} \setminus \{0\}$$

$$\text{c) } \frac{1}{x+2} = \frac{2}{x-3} \quad | (x+2)(x-3)$$

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

$$x-3 = 2x+4$$

$$-7 = x, \quad \underline{\underline{x = -7}}$$

$$\mathbb{D} = \mathbb{R} \setminus \{-2, 3\}$$

$$\text{d) } -\frac{x+2}{x-2} + \frac{x-2}{x+2} = -\frac{4}{x^2-4}$$

$$-\frac{x+2}{x-2} + \frac{x-2}{x+2} = -\frac{4}{(x+2)(x-2)} \quad | \cdot (x+2)(x-2)$$

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

$$-\underline{x^2 - 4x - 4} + \underline{x^2 - 4x + 4} = -4$$

$$-8x = -4$$

$$\underline{\underline{x = \frac{1}{2}}}$$

$$\mathbb{D} = \mathbb{R} \setminus \{\pm 2\}$$

$$e) \frac{x}{(x-3)^2} - \frac{1}{x(x-3)} = \frac{1}{x} \quad | \cdot (x-3)^2 \cdot x$$

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

$$x^2 - x + 3 = x^2 - 6x + 9$$

$$5x = 6$$

$$\underline{\underline{x = 6/5}} \quad \mathbb{D} = \mathbb{R} \setminus \{0, 3\}$$

~~$$f) \frac{y-1}{(y+1)(y-2)} + \frac{y-3}{(y-2)^2} = + \frac{2}{2(y-2)} \quad | \cdot (y-2)^2(y+1)$$~~

~~$$(y-1)(y+2) + (y-3)(y+1) = 2(y-2)(y+1)$$~~

~~$$\underline{y^2 + 3y + 2} + \underline{y^2 - 2y - 3} = \underline{2y^2 - 2y - 4}$$~~

~~$$-y - 5 = -2y - 4 \quad | +2y + 5$$~~

~~$$\underline{\underline{y = 1}}$$~~

~~$$\mathbb{D} = \mathbb{R} \setminus \{-1, 2\}$$~~

~~$$g) \frac{3x - x^2}{x} - \frac{4 + 4x}{2} = \frac{-45x^3}{15x^2 + 5x} + 2$$~~

*siehe hinte*

~~$$3 - x - (2 + 2x) = \frac{9x^2}{3x + 1} + 2$$~~

~~$$1 + (3x) =$$~~

~~$$(1+x)$$~~

~~$$(x+1)(3x+1) = -9x^2 + 2(3x+1)$$~~

~~$$3x^2 + 4x + 1 = -9x^2 + 6x + 2$$~~

~~$$12x^2 - 2x - 1 = 0$$~~

~~$$x = -1/6$$~~

$$g) \frac{3x-x^2}{x} - \frac{4+4x}{2} = \frac{-45x^3}{15x^2+5x} + 2$$

$$x \frac{(3-x)}{x} - \frac{2(2+2x)}{2} = \frac{-5x-9x^2}{5x(3x+1)} + 2$$

$$3-x - (2+2x) = \frac{-9x^2}{3x+1} + 2$$

$$1-3x = -\frac{9x^2}{3x+1} + 2 \quad | \cdot (3x+1)$$

$$(3x+1)(1-3x) = -9x^2 + 2(3x+1)$$

$$-9x^2 + 1 = -9x^2 + 6x + 2$$

$$1 = 6x + 2 \quad | -2$$

$$-1 = 6x$$

$$\underline{\underline{x = -\frac{1}{6}}}$$

$$D = \mathbb{R} \setminus \left\{ -\frac{1}{3}, 0 \right\}$$

$$h) \frac{x - \frac{2}{3}}{\frac{2x}{3} - 1} = \frac{\frac{3x}{2} - \frac{1}{3}}{x - \frac{4}{3}} \quad \frac{9x-2}{6} - \frac{2}{6}$$

$$\frac{\frac{3x-2}{3}}{\frac{2x-3}{3}} = \frac{\cancel{9x-2}}{\cancel{3}} = \frac{9x-2}{6} = \frac{9x-2}{6} = \frac{9x-2}{6} = \frac{9x-2}{6} = \frac{9x-2}{6} = \frac{9x-2}{6} = \frac{9x-2}{6} = \frac{9x-2}{6} = \frac{9x-2}{6}$$

$$\frac{3x-2}{2x-3} = \frac{9x-2}{6x-8}$$

$$(3x-2)(6x-8) = (9x-2)(2x-3)$$

$$\cancel{18x^2} - 36x + 16 = \cancel{18x^2} - 31x + 6 \quad | +36x - 6$$

$$10 = 5x$$

$$\underline{\underline{x = 2}}$$

$$D = \mathbb{R} \setminus \left\{ \frac{4}{3}, \frac{3}{2} \right\}$$

$$h) \quad \frac{2x}{3} - 1 = 0$$

$$\frac{2x}{3} = 1, \quad 2x = 3, \quad x = \frac{3}{2}$$

$$x - \frac{4}{3} = 0$$

$$x = \frac{4}{3}$$

f)

$$\frac{y-1}{(y-2)(y+1)} - \frac{3-y}{(y-2)^2} = \frac{2}{y-2} \quad \left| (y-2)^2(y+1) \right.$$

$$(y-1)(y-2) - (3-y)(y+1) = 2(y-2)(y+1)$$

$$\cancel{y^2} - 3y + 2 + \cancel{y^2} - 2y - 3 = \cancel{2y^2} - 2y - 4$$

$$-5y - 1 = -2y - 4$$

$$3 = 3y$$

$$\underline{\underline{y = 1}}$$