Descompuneri în factori - 2 -

$$24x^{m+3}\cdot y^{m-2} - 8x^{m-4}\cdot y^{m+2} + 12x^{m}\cdot y^{m-5} =$$
$$= 4\cdot x^{m-4}\cdot y^{m-5}\cdot 6\cdot x^7\cdot y^3 - 4\cdot x^{m-4}\cdot y^{m-5}\cdot y^7\cdot 2 + 4\cdot 3\cdot x^{m-4}\cdot y^{m-5}\cdot x^4 =$$
$$= 4x^{m-4}\cdot y^{m-5}\cdot \left(6x^7\cdot y^3 - 2\cdot y^7 + 3\cdot x^4\right)$$

$$x^{m+3}\cdot y^{m-4} - x^{m-3}\cdot y^{m+5} - x^{m-1}\cdot y^{m-2} =$$
$$= x^{m-3}\cdot y^{m-4}\cdot x^6 - x^{m-3}\cdot y^{m-4}\cdot y^9 - x^{m-3}\cdot y^{m-4}\cdot x^2\cdot y^2 =$$
$$= x^{m-3}\cdot y^{m-4}\cdot \left(x^6 - y^9 - x^2 y^2\right)$$

$$a^2 \pm 2ab + b^2 = (a \pm b)^2$$
$$(a+b)(a-b) = a^2 - b^2$$

$$-2\sqrt{75}\,x^4 + 3\sqrt{27}\,x^5 - 2\sqrt{243}\,x^2 =$$
$$= -2\cdot 5\sqrt{3}\,x^4 + 3\cdot 3\sqrt{3}\,x^5 - 2\cdot 9\sqrt{3}\,x^2 = \sqrt{3}\,x^2\cdot\left(9x^3 - 10x^2 - 18\right)$$

$$x^2 - 6x + y^2 + 4y + 13 = x^2 - 2\cdot 3\cdot x + 3^2 + y^2 + 2\cdot 2y + 2^2 =$$
$$= \underbrace{(x-3)^2 + (y+2)^2}_{\text{nu se descompune în } \mathbb{R}}$$

$$x^2 + 10x - y^2 - 8y + 9 = x^2 + 2\cdot 5x + 5^2 - y^2 - 2\cdot 4y - 4^2 =$$
$$= (x+5)^2 - 1\cdot\left(y^2 + 2\cdot 4y + 4^2\right) = (x+5)^2 - (y+4)^2 =$$
$$= \left[(x+5) + (y+4)\right]\cdot\left[(x+5) - (y+4)\right] =$$
$$= (x+y+9)\cdot(x-y+1)$$

$$x^2 - 6x - y^2 - 4y + 5 = x^2 - 2\cdot 3\cdot x + 3^2 - y^2 - 2\cdot 2\cdot y - 2^2 =$$
$$= (x-3)^2 - (y+2)^2 = (x-3+y+2)(x-3-y-2) = (x+y-1)(x-y-5)$$

$$x^2 + 7x + 12 = \underbrace{x^2 + 4x} + \underbrace{3x + 12} = x(x+4) + 3(x+4) = (x+4)(x+3)$$

$$x^2 - ax + bx - b\cdot a = x(x-a) + b(x-a) = (x-a)(x+b)$$

$x^2 - x - 42 = x^2 + 6x - 7x - 42 = x(x+6) - 7(x+6) = (x+6)(x-7)$

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

$9x^2 - 3xy + \frac{y^2}{4} = (3x)^2 - 2 \cdot 3x \cdot \frac{y}{2} + \left(\frac{y}{2}\right)^2 = \left(3x - \frac{y}{2}\right)^2$

$x^2 + x + 2 = ?$ $\quad x^2 + x + 2 = \underset{a}{1} \cdot x^2 + \underset{b}{1} \cdot x + \underset{c}{2}$

$a = 1 \quad b = 1 \quad c = 2 \quad \Delta = b^2 - 4ac = 1^2 - 4 \cdot 1 \cdot 2 = 1 - 8 = -7$

$\Delta < 0 \Rightarrow x^2 + x + 2$ nu se descompune în $\mathbb{R}$

V1

$1 \cdot x^2 + 9x + 14 = ?$ $\quad a = 1 \quad b = 9 \quad c = 14$

$\Delta = b^2 - 4ac = 9^2 - 4 \cdot 1 \cdot 14 = 81 - 56 = 25 \quad \sqrt{\Delta} = 5$

$x_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2a} = \begin{cases} \frac{-9+5}{2 \cdot 1} = -2 \\ \frac{-9-5}{2 \cdot 1} = -7 \end{cases} \Rightarrow ax^2 + bx + c = a(x - x_1)(x - x_2)$

$x^2 + 9x + 14 = (x - (-2))(x - (-7)) = (x+2)(x+7)$

V2 $\quad x^2 + 9x + 14 = x^2 + 2x + 7x + 14 = x(x+2) + 7(x+2) = (x+2)(x+7)$

V1

$x^2 - x - 20 = ?$ $\quad \underset{a=1}{1} \cdot x^2 + \underset{b=-1}{(-1)} \cdot x + \underset{c=-20}{(-20)} = ?$

$\Delta = b^2 - 4ac = (-1)^2 - 4 \cdot 1 \cdot (-20) = 1 + 80 = 81 \Rightarrow \sqrt{\Delta} = \sqrt{81} = 9$

$x_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2a} = \begin{cases} = \frac{-(-1)+9}{2 \cdot 1} = 5 \\ = \frac{-(-1)-9}{2 \cdot 1} = -4 \end{cases} \quad x^2 - x - 20 = (x-5)(x-(-4)) = (x-5)(x+4)$

V2

$x^2 - x - 20 = x^2 - 5x + 4x - 20 = x(x-5) + 4(x-5) = (x-5)(x+4)$

$$2x^2 - x - 3 = ?\quad a=2 \quad b=-1 \quad c=-3$$

$$\Delta = b^2 - 4ac = (-1)^2 - 4\cdot 2\cdot(-3) = 25 \qquad \sqrt{\Delta} = \sqrt{25} = 5$$

$$x_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2a} = \begin{cases} \frac{1+5}{4} = \frac{3}{2} \\ \frac{1-5}{4} = -1 \end{cases}$$

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

$$3x^2 + 2\sqrt{3}x + 1 = (\sqrt{3}x)^2 + 2\cdot\sqrt{3}\cdot x\cdot 1 + 1^2 = (\sqrt{3}x+1)^2$$

$$2x^2 + 2\sqrt{6}x + 3 = (\sqrt{2}x)^2 + 2\cdot\sqrt{2}\cdot\sqrt{3}x + (\sqrt{3})^2 = (\sqrt{2}x + \sqrt{3})^2$$

$$5x^2 + \sqrt{5} = \sqrt{5}\cdot\sqrt{5}\cdot x^2 + \sqrt{5}\cdot 1 = \sqrt{5}\,(\sqrt{5}x^2 + 1)$$

$$x^4 + 5x^2 + 6 = \underbrace{x^4 + 3x^2}_{} + \underbrace{2x^2 + 6}_{} = x^2(x^2+3) + 2\cdot(x^2+3) = (x^2+3)(x^2+2)$$

$$x^4 - 5x^2 + 4 = x^4 - x^2 - 4x^2 + 4 = x^2\cdot(x^2-1) - 4(x^2-1) =$$

$$= (x^2-1)\cdot(x^2-4) = (x^2-1^2)\cdot(x^2-2^2) = (x-1)(x+1)(x-2)(x+2)$$

$$x^4 + x^2 + 1 = x^4 + 2\cdot x^2\cdot 1 + 1^2 - x^2 =$$

$$= (x^2)^2 + 2x^2\cdot 1 + 1^2 - x^2 = (x^2+1)^2 - x^2 =$$

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

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

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

$$x^2 = t \Rightarrow x^4 = t^2$$

$$3t^2 + t - 4 = ?$$

$$\Delta = b^2 - 4ac = 1 - 4\cdot 3\cdot(-4) = 49 \Rightarrow \sqrt{\Delta} = 7$$

$$t_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-1 \pm 7}{6} = \begin{cases} 1 \\ -\frac{4}{3} \end{cases}$$

$$3t^2 + t - 4 = 3\cdot(t-1)\cdot\left(t - \left(-\frac{4}{3}\right)\right) = (t-1)\cdot\left(3t + 3\cdot\frac{4}{3}\right) =$$

$$= (t-1)\cdot(3t+4) \Rightarrow$$

$$3x^4 + x^2 - 4 = (x^2-1)(3x^2+4) = (x-1)(x+1)(3x^2+4)$$