

Descompunere în factori

i) Scoaterea factorului comun:

$$24x^2y^2z \cdot 2 \cdot y^2 - 12xy^2xz^2 + 18x^2y^2z^2 = \left\{ \begin{array}{l} 24 = 2^3 \cdot 3 \\ 12 = 2^2 \cdot 3 \\ 18 = 2 \cdot 3^2 \\ (24, 12, 18) = 2 \cdot 3 = 6 \end{array} \right.$$

$$= 6 \cdot x^2y^2z \cdot (4xy - 2x^2z^2 + 3z)$$

$$5 \cdot x \cdot 5 \cdot x \cdot 2y^2 - 15x^2 \cdot 3 \cdot y + 25x^2y = 50x^2y^2 - 45x^3y + 25x^2y =$$

$$= 5x^2y \cdot (10y - 9x + 5)$$

$$3\sqrt{75}x^2y - 2\sqrt{27}xy^2 + 4\sqrt{12}xy = 3\sqrt{5}x^2y - 2\sqrt{3}xy^2 + 4\sqrt{3}xy =$$

$$= \sqrt{3}x \cdot y \cdot (15x - 6y + 8) \quad \left\{ \begin{array}{l} -2 + ? = 2 \Rightarrow ? = 2 + 2 \Rightarrow ? = 4 \\ -2 + ? = 0 \end{array} \right.$$

$$2\underline{x^m \cdot y^{m+2}} - 4x^{\underline{m-1}} \cdot y^m - 8x^{\underline{m+3}} \cdot y^{\underline{m-2}} =$$

$$= 2 \cdot \underline{x^{m-1} \cdot x^1 \cdot y^{m-2} \cdot y^4} - 4 \cdot \underline{x^{m-1} \cdot y^{m-2} \cdot y^2} - 8 \cdot \underline{x^{m-1} \cdot x^2 \cdot y^{m-2}} =$$

$$= 2 \cdot x^{m-1} \cdot y^{m-2} \cdot (x^4 - 2y^2 - 4x^4) \quad \left\{ \begin{array}{l} -4 + ? = 5 \quad ? = 5 + 4 \\ -3 + ? = 2 \Rightarrow ? = 2 + 3 \end{array} \right.$$

$$x^{m+5} \cdot y^{m-3} + x^{m-4} \cdot y^{m+2} - x^{m-2} \cdot y^{m-1} =$$

$$= x^{m-4} \cdot y^{m-3} \cdot x^5 + x^{m-4} \cdot y^{m-3} \cdot y^5 - x^{m-4} \cdot x^2 \cdot y^{m-3} \cdot y^2 =$$

$$= x^{m-4} \cdot y^{m-3} \cdot (x^5 + y^5 - x^2y^2) \quad \left\{ \begin{array}{l} a^2 - b^2 = (a+b)(a-b) \\ a^2 + 2ab + b^2 = (a+b)^2 \end{array} \right.$$

GRUPAREA TERMENILOR

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

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

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

$$x^2 - 5x + 4 = \underbrace{x^2 - 1 \cdot x}_{R} - \underbrace{4 \cdot x + 4}_{R} = x \cdot (x-1) - 4 \cdot (x-1) = (x-1)(x-4)$$

$$x^2 - 2x - 8 = \underbrace{x^2 - 4x}_{R} + \underbrace{2x + 8}_{R} = 1 \cdot (x-4) + 2(x+4) = (x-4)(x+2)$$

$$x^2 - x - 2 = \underbrace{x^2 + x}_{R} - \underbrace{2x - 2}_{R} = x(x+1) - 2 \cdot (x+1) = (x+1)(x-2)$$

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

Fie $a, b, c \in \mathbb{R}$, $x \in \mathbb{R}$, $a \neq 0$

\hookrightarrow coeficienți

$$ax^2 + bx + c = 0$$

Calculăm un număr, $\Delta = b^2 - 4ac \Rightarrow$ vom avea 3 variante:

$$\text{C\u00f7i } \Delta < 0$$



$$ax^2 + bx + c \Rightarrow$$

Nu se poate descompune în \mathbb{R}

$$\text{C\u00f7ii } \Delta > 0$$

$$x_1 = \frac{-b + \sqrt{\Delta}}{2a}$$



$$x_2 = \frac{-b - \sqrt{\Delta}}{2a}$$

$$\text{C\u00f7iii } \Delta = 0$$

$$x_1 = x_2 = \frac{-b}{2a}$$

$$\begin{aligned} ax^2 + bx + c &= a(x - x_1)(x - x_2) = \\ &= a \cdot (x - x_1)^2 \end{aligned}$$

$$ax^2 + bx + c = a \cdot (x - x_1)(x - x_2)$$

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

$$a=2$$

$$b=1$$

$$c=-3$$

$$\Delta = b^2 - 4ac = 1^2 - 4 \cdot 2 \cdot (-3) = 1 + 24 = 25$$

$$\sqrt{\Delta} = \sqrt{25} = 5$$

$$x_1 = \frac{-b + \sqrt{\Delta}}{2a} = \frac{-1 + 5}{2 \cdot 2} = \frac{4}{4} = 1$$

$$x_2 = \frac{-b - \sqrt{\Delta}}{2a} = \frac{-1 - 5}{2 \cdot 2} = \frac{-6}{4} = -\frac{3}{2}$$

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

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

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

$$\begin{array}{l} 3x^2 - x + 10 = ? \\ + 3x^2 + (-1)x + 10 = ? \end{array} \quad \left\{ \begin{array}{l} a=3 \\ b=-1 \\ c=10 \end{array} \right. \quad \begin{array}{l} \Delta = b^2 - 4ac \\ \Delta = (-1)^2 - 4 \cdot 3 \cdot 10 = 1 - 120 = -119 \\ \sqrt{\Delta} = \sqrt{-119} \notin \mathbb{R} \Rightarrow \\ 3x^2 - x + 10 \text{ nu se decompune in } \mathbb{R} \end{array}$$

Atentie: daca $a < 0 \Rightarrow \sqrt{a} \notin \mathbb{R}$

$$\text{Daca } \sqrt{-4} = 2 \Rightarrow 2^2 = -4 \Rightarrow 4 = -4 \text{ (F)}$$

$$\sqrt{-4} = -2 \Rightarrow (-2)^2 = -4 \Rightarrow +4 = -4 \text{ (F)}$$

$$\sqrt{-4} \notin \mathbb{R}$$

$$\begin{array}{r|rr} 121 & 11 \\ \hline & 11 \\ & 0 \end{array} > 11$$

$$a=3 \quad \Delta = b^2 - 4ac$$

$$b=-1 \quad \Delta = (-1)^2 - 4 \cdot 3 \cdot (-10)$$

$$c=-10 \quad \Delta = 1 + 120 = 121 \Rightarrow \sqrt{\Delta} = \sqrt{121} = 11$$

$$x_1 = \frac{-b + \sqrt{\Delta}}{2a} = \frac{-(-1) + 11}{2 \cdot 3} = \frac{1+11}{6} = \frac{12}{6} = 2$$

$$x_2 = \frac{-b - \sqrt{\Delta}}{2a} = \frac{-(-1) - 11}{2 \cdot 3} = \frac{1-11}{6} = \frac{-10}{6} = -\frac{5}{3}$$

$$\begin{aligned} 3x^2 - x - 10 &= 3 \cdot (x-2) \cdot \left(x - \left(-\frac{5}{3}\right)\right) = 3(x-2)(x+\frac{5}{3}) = \\ &= (x-2) \cdot (3x + \cancel{3} \cdot \frac{5}{\cancel{3}}) = (x-2) \cdot (3x+5) \end{aligned}$$

$$\begin{array}{l} x^2 + 10x + 25 = ? \\ a \cdot x^2 + 10 \cdot x + 25 = ? \end{array} \quad \left\{ \begin{array}{l} \Delta = b^2 - 4ac = 100 - 4 \cdot 1 \cdot 25 = 100 - 100 = 0 \\ x_1 = x_2 = \frac{-10}{2 \cdot 1} = -5 \end{array} \right. \quad \begin{array}{l} x^2 + 10x + 25 = 1 \cdot (x+5)(x+5) = (x+5)^2 \\ (x - (-5)) (x - (-5)) \end{array}$$

$$x^2 + 10x + 25 = x^2 + 2 \cdot 5x + 5^2 = (x+5)^2$$