

## Decomponere in fattori

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

$$\textcircled{1} \quad x^2 - 3x - 4 = x^2 + x - 4x - 4 = x(x+1) - 4(x+1) = (x+1)(x-4)$$

$$\textcircled{2} \quad x^2 - 3x - 4 = 0 \quad \left| \begin{array}{l} a=1 \quad b=-3 \quad c=-4 \Rightarrow \Delta = b^2 - 4ac \\ ax^2 + bx + c = 0 \quad \Delta = (-3)^2 - 4 \cdot 1 \cdot (-4) = 9 + 16 = 25 \Rightarrow \sqrt{\Delta} = \sqrt{25} = 5 \end{array} \right.$$

$$\left. \begin{array}{l} x_1 = \frac{-b + \sqrt{\Delta}}{2a} = \frac{-(-3) + 5}{2 \cdot 1} = \frac{8}{2} = 4 \\ x_2 = \frac{-b - \sqrt{\Delta}}{2a} = \frac{-(-3) - 5}{2 \cdot 1} = \frac{-2}{2} = -1 \end{array} \right\} \Rightarrow x^2 - 3x - 4 = 1 \cdot (x-4)(x-(-1)) = (x-4)(x+1)$$

$a x^2 + b x + c = a \cdot (x - x_1)(x - x_2)$   
 $a \neq 0$

$$x^2 - x - 2 = ?$$

$$\textcircled{1} \quad x^2 - x - 2 = x^2 + x - 2x - 2 = x(x+1) - 2(x+1) = (x+1)(x-2)$$

$$\textcircled{2} \quad x^2 - x - 2 = 0 \quad \left| \begin{array}{l} \Delta = b^2 - 4ac = (-1)^2 - 4 \cdot 1 \cdot (-2) = 1 + 8 = 9 \Rightarrow \sqrt{\Delta} = \sqrt{9} = 3 \\ a=1 \quad b=-1 \quad c=-2 \quad x_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2a} = \begin{cases} \frac{-(-1)+3}{2 \cdot 1} = \frac{4}{2} = 2 \\ \frac{-(-1)-3}{2 \cdot 1} = \frac{-2}{2} = -1 \end{cases} \end{array} \right.$$

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

$$x^2 + 5x - 6 = ?$$

$$\textcircled{1} \quad x^2 + 5x - 6 = x^2 + 6x - x - 6 = x \cdot (x+6) - 1 \cdot (x+6) = (x+6)(x-1)$$

$$\textcircled{2} \quad x^2 + 5x - 6 = 0 \quad \left| \begin{array}{l} \Delta = b^2 - 4ac = 5^2 - 4 \cdot 1 \cdot (-6) = 25 + 24 = 49 \\ \sqrt{\Delta} = \sqrt{49} = 7 \\ a=1 \quad b=5 \quad c=-6 \\ ax^2 + bx + c = 0 \\ 1 \cdot x^2 + 5 \cdot x + (-6) = 0 \quad x_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2a} = \begin{cases} \frac{-5+7}{2 \cdot 1} = 1 \\ \frac{-5-7}{2 \cdot 1} = -6 \end{cases} \end{array} \right\} \Rightarrow$$

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

$$2x^2 + 3x - 5 = ? \quad \left| \begin{array}{l} \Delta = b^2 - 4ac = 3^2 - 4 \cdot 2 \cdot (-5) = 9 + 40 = 49 \Rightarrow \sqrt{\Delta} = \sqrt{49} = 7 \\ a=2 \quad b=3 \quad c=-5 \quad x_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2a} = \begin{cases} \frac{-3+7}{2 \cdot 2} = \frac{4}{4} = 1 \\ \frac{-3-7}{2 \cdot 2} = \frac{-10}{4} = -\frac{5}{2} \end{cases} \end{array} \right.$$

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

$$= 2(x-1) \cdot \left( x + \frac{5}{2} \right) = (x-1) \cdot \left( 2x + 2 \cdot \frac{5}{2} \right) = (x-1)(2x+5)$$

$$\textcircled{V2} \quad 2x^2 + 3x - 5 = 2x^2 + \underbrace{5x - 2x}_{-5} = 2x \cdot (x+1) + 5(x-1) = (x+5)(2x-1)$$

$$\textcircled{VI1} \quad 2x^2 - x - 10 = ? \quad \left\{ \begin{array}{l} \Delta = b^2 - 4ac = (-1)^2 - 4 \cdot 2 \cdot (-10) = 1 + 80 = 81 \Rightarrow \sqrt{\Delta} = \sqrt{81} = 9 \\ a=2 \quad b=-1 \quad c=-10 \end{array} \right. \quad \left\{ \begin{array}{l} x_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-(-1) \pm 9}{2 \cdot 2} = \frac{10}{4} = \frac{5}{2} \\ \qquad \qquad \qquad \frac{-(-1)-9}{2 \cdot 2} = \frac{-8}{4} = -2 \end{array} \right.$$

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

$$\textcircled{VI2} \quad 2x^2 - x - 10 = 2x^2 + 4x - 5x - 10 = 2x(x+2) - 5(x+2) = (x+2)(2x-5)$$

$$9y^2 - x^2 - 2x - 1 = (3y)^2 - (x^2 + 2x + 1) = (3y)^2 - (x+1)^2 = \\ a^2 - b^2 = (a-b)(a+b) \quad \left. \right\} \quad = (3y - (x+1)) \cdot (3y + (x+1)) = \\ = (3y - x - 1)(3y + x + 1)$$

$$16x^2 - y^2 + 6y - 9 = (4x)^2 - (y^2 - 2 \cdot 3y + 3^2) = (4x)^2 - (y-3)^2 = \\ = (4x - (y-3)) \cdot (4x + (y-3)) = (4x-y+3)(4x+y-3)$$

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