Equazioni reciproche

3° grado 1ª specie

$$ax^3+bx^2+bx+a=0$$

Es. $3x^3+13x^2+13x+3=0$

	3	13	13	3
-1		-3	-10	-3
	3	10	3	//

$$(x+1)(3x^2+10x+3)=0$$

$$x_1=-1$$

$$\frac{\Delta}{4}=25-9=16$$

$$x_{2,3}=\frac{-5\pm4}{3}\rightarrow -\frac{1}{3},\ -3$$

3° grado 2ª specie

$$ax^3 + bx^2 - bx - a = 0$$

Es. $3x^3 + 7x^2 - 7x - 3 = 0$

	3	7	−7	−3
1		3	10	3
	3	10	3	/

$$(x-1)(3x^2 + 10x + 3) = 0$$

$$x_1 = 1 \qquad x_2 = -\frac{1}{3} \qquad x_3 = -3$$

4° grado 1ª specie

$$ax^4+bx^3+cx^2+bx+a=0$$

$$12x^4+4x^3-41x^2+4x+12=0$$

Dividiamo per $x^2\neq 0$

$$12x^2+4x-41+\frac{4}{x}+\frac{12}{x^2}=0$$

$$12\left(x^2+\frac{1}{x^2}\right)+4\left(x+\frac{1}{x}\right)-41=0$$

$$x+\frac{1}{x}=t \qquad \left(x+\frac{1}{x}\right)^2=t^2$$

$$x^2+\frac{1}{x^2}+2=t^2 \qquad x^2+\frac{1}{x^2}=t^2-2$$

$$12(t^2-2)+4t-41=0$$

$$12t^2-24+4t-41=0$$

$$12t^2 + 4t - 65 = 0$$

$$\frac{\Delta}{4} = 4 + 780 = 784 = 28^2$$

$$t_{1,2} = \frac{-2 \pm 28}{12}$$

$$t_1 = \frac{26}{12} = \frac{13}{6}$$

$$t_2 = -\frac{30}{12} = -\frac{5}{2}$$

$$x + \frac{1}{x} = \frac{13}{6}$$

$$\frac{6x^2 + 6 - 13x}{6x} = 0$$

$$6x^2 - 13x + 6 = 0$$

$$x_1 = \frac{2}{3} \qquad x_2 = \frac{3}{2}$$

$$x + \frac{1}{x} = -\frac{5}{2}$$

$$\frac{2x^2 + 2 + 5x}{2x} = 0$$

$$2x^2 + 5x + 2 = 0$$

$$x_3 = -\frac{1}{2} \qquad x_4 = -2$$

4° grado 2ª specie

$$ax^4 + bx^3 - bx - a = 0$$

$$10x^4 - 29x^3 + 29x - 10 = 0$$

$$10(x^4 - 1) - 29x(x^2 - 1) = 0$$

$$10(x^2 - 1)(x^2 + 1) - 29x(x^2 - 1) = 0$$

$$(x^2 - 1)(10x^2 + 10 - 29x) = 0$$

$$\downarrow \qquad\qquad \downarrow$$

$$x = \pm 1 \qquad\qquad 10x^2 - 29x + 10 = 0$$

$$\begin{cases} y = x^2 - 1 \\ y = 2x - 3 \end{cases}$$

parabola

retta

$$x^2 - 1 = 2x - 3$$

$$x^2 - 2x + 2 = 0$$

$$\frac{\Delta}{4} = 1 - 2 < 0$$

$\emptyset$

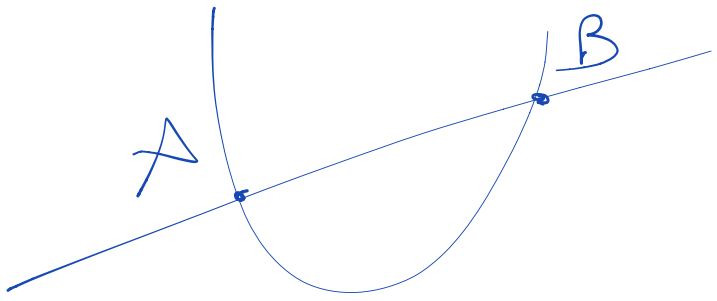
$\cup$

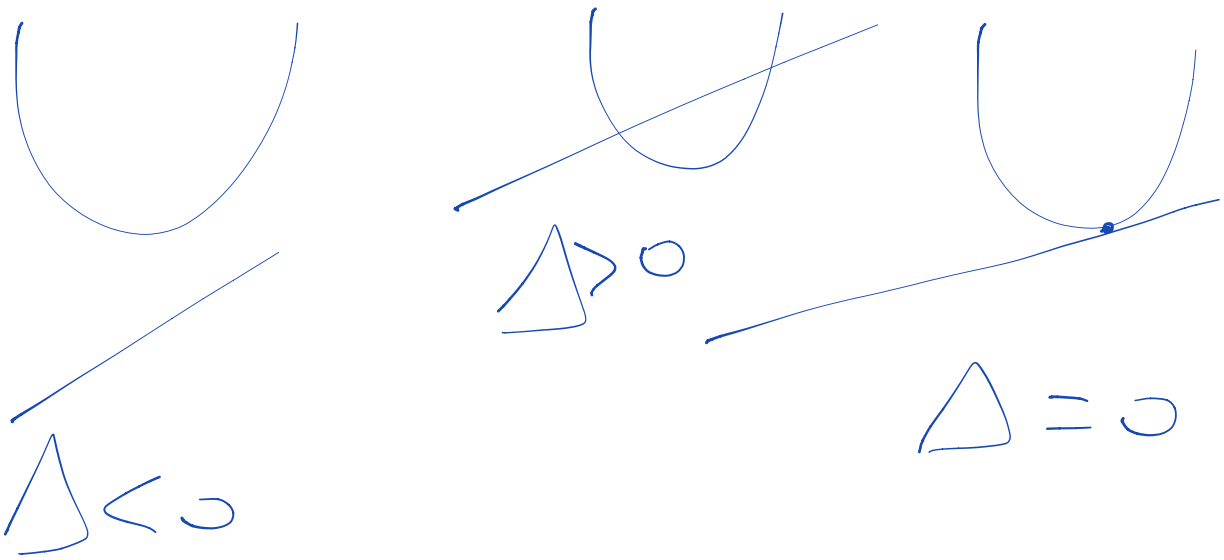
$$\begin{cases} x^2+2x-y=3 \\ y-2x=1 \end{cases} \qquad \begin{cases} y=x^2+2x-3 \\ y=2x+1 \end{cases}$$

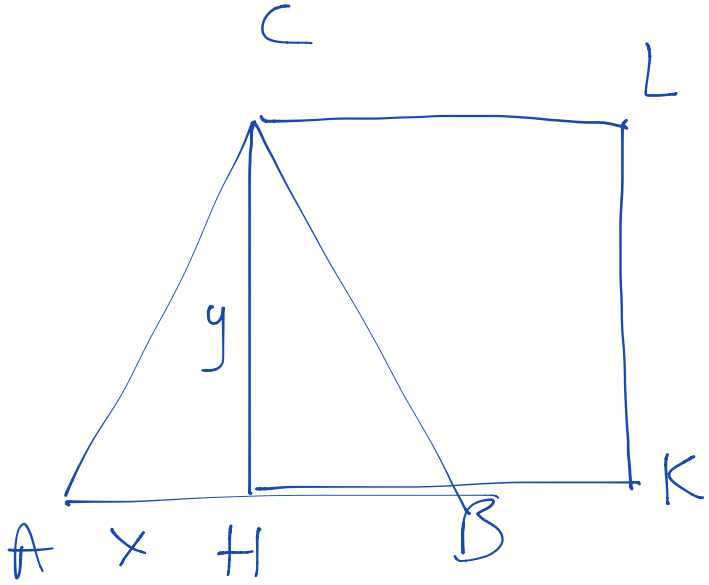
$$\begin{cases} y=2x+1 \\ x^2+\cancel{2x}-\cancel{2x}-1=3 \end{cases}$$

$$\begin{cases} y=2x+1 \\ x^2=4 \end{cases} \qquad \begin{cases} x=\pm 2 \end{cases}$$

$A(-2;-3)$ $\quad B(2;5)$







$\overline{AH} = x$

$\overline{CH} = y$

$$A(\hat{\Delta}ABC) = \frac{3}{4}\,\overline{CH}^2$$

$$2\overline{CH} = \overline{AB} + 4$$

$$2y = 2x + 4 \Rightarrow y = x + 2$$

$$\frac{2xy}{2} = \frac{3}{4}y^2$$

$$\begin{cases} y = x + 2 \\ xy = \frac{3}{4}y^2 \end{cases}$$

$$x(x+2) = \frac{3}{4}(x+2)^2$$

$$x = \frac{3}{4}(x+2)$$

$$4x = 3x + 6$$

$$x = 6 \qquad y = 8$$

$$\overline{AB} = 12 \text{ cm}$$