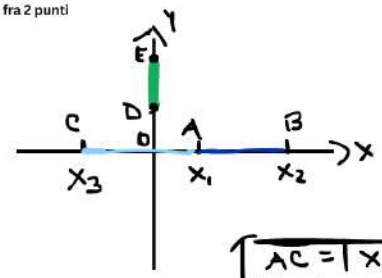
LEZIONE 1

Nozioni elementari di geometria analitica

Distanza fra 2 punti



D(0,0)

C(x_3, 0)

CASO (A)

A(x_1, 0) B(x_2, 0)

$\overline{AB} = |x_B - x_A| = |x_2 - x_1|$

La distanza è una quantità positiva a prescindere

$\overline{AC} = |x_1 - x_3| =$

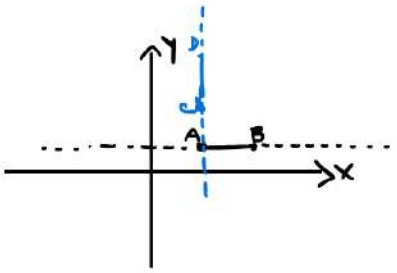
$\overline{CA} = |x_3 - x_1|$

ALTRIMENTI SAREBBE NEGATIVA

$x_1 = 1$ $x_3 = -3$ A(1, 0) C(-3, 0)

$\overline{CA} = |x_C - x_A| = |-3 - 1| = |-4| = 4$

D(x_D, y_D) ; E(0, y_E) $\overline{DE} = |y_E - y_D|$



$\overline{AB} = |x_B - x_A|$

$\overline{CD} = |y_D - y_C|$

$\overline{CD} \parallel \vec{j}$ (eje y)

$\overline{AB} \parallel \vec{i}$ (eje x)

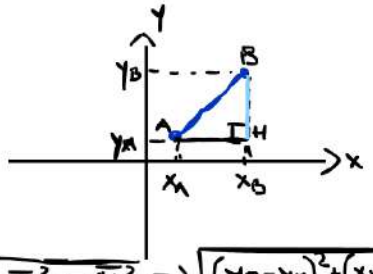
CASO (B)

A (x_A, y_A) — $y_A = y_B$

B (x_B, y_B)

C (x_C, y_C) — $x_C = x_D$

D (x_D, y_D)



CASO (c)

$A(x_A, y_A)$

$B(x_B, y_B)$

ABH TRIANGOLO RETTANGOLO IN H

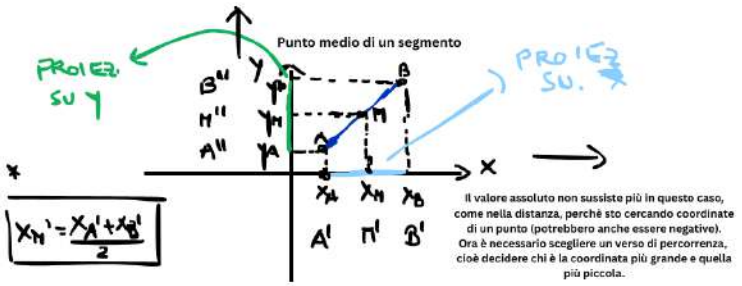
$H(x_B, y_A)$

$\overline{AB} = \sqrt{\overline{BH}^2 + \overline{AH}^2} = \sqrt{(y_B - y_H)^2 + (x_H - x_A)^2} =$

$= \sqrt{(y_B - y_A)^2 + (x_B - x_A)^2}$

$\overline{AB} = \sqrt{(y_B - y_A)^2 + (x_B - x_A)^2}$

Formula della distanza fra due punti



$$x_{M'} = \frac{x_{A'} + x_{B'}}{2}$$

$$A'M' = M'B'$$

$$x_{M'} - x_{A'} = x_{B'} - x_{M'} \Rightarrow 2x_{M'} = x_{B'} + x_{A'}$$

$A(x_A; y_A)$
$B(x_B; y_B)$
$M(x_M; y_M)$
$A'(x_A, 0)$
$M'(x_M, 0)$
$B'(x_B, 0)$
$A''(0, y_A)$
$M''(0, y_M)$
$B''(0, y_B)$

$$X_M = \frac{X_A + X_B}{2}$$

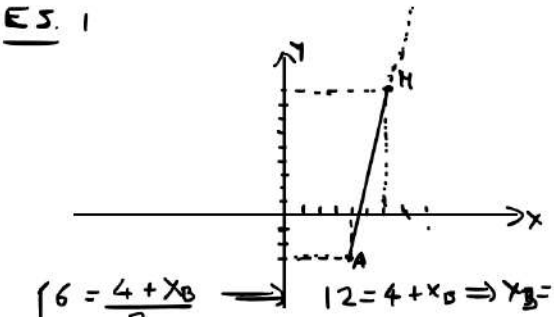
Coordinata x del punto medio

$$Y_M = \frac{Y_A + Y_B}{2}$$

Coordinata y del punto medio

$$M\left(\frac{X_A + X_B}{2} ; \frac{Y_A + Y_B}{2}\right)$$

ES. 1



M (6, 9)
B ? $x_B = ?$ $y_B = ?$
A (4; −3)

$$\begin{cases} x_M = \frac{x_A + x_B}{2} \\ y_M = \frac{y_A + y_B}{2} \end{cases}$$

$$\begin{cases} 6 = \frac{4 + x_B}{2} \Rightarrow 12 = 4 + x_B \Rightarrow x_B = 8 \\ 9 = \frac{-3 + y_B}{2} \Rightarrow 18 = -3 + y_B \Rightarrow y_B = 21 \end{cases}$$

B (8, 21)

Es. 2

$A(1-2k; 1)$

$B(k; 1)$

$k \in \mathbb{R}$: $\overline{AB} = 2$

$\sqrt{(x_B - x_A)^2 + (y_B - y_A)^2} = 2$

$(x_B - x_A)^2 + (y_B - y_A)^2 = 4$

$(k - 1 + 2k)^2 + (1-1) = 4$

$(3k-1)^2 = 4 \Rightarrow$

$9k^2 + 1 - 6k = 4$

$9k^2 - 6k - 3 = 0$

$3k^2 - 2k - 1 = 0$

$\Delta = b^2 - 4ac$

$\Delta = 4 - 4(3)(-1) = 4 + 12 = 16$

$k_1, k_2 = \frac{-b \pm \sqrt{\Delta}}{2a}$

$k_1, k_2 = \frac{2 \pm 4}{6} \rightarrow \frac{2-4}{6} = \frac{-2}{6} = -\frac{1}{3}$

$\frac{2+4}{6} = \frac{6}{6} = 1$

$k = -\frac{1}{3} \vee k = 1$