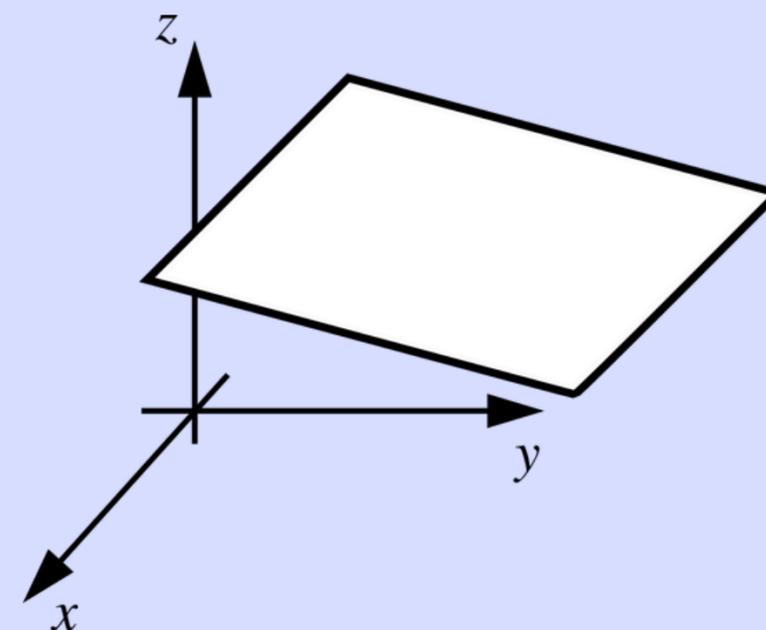
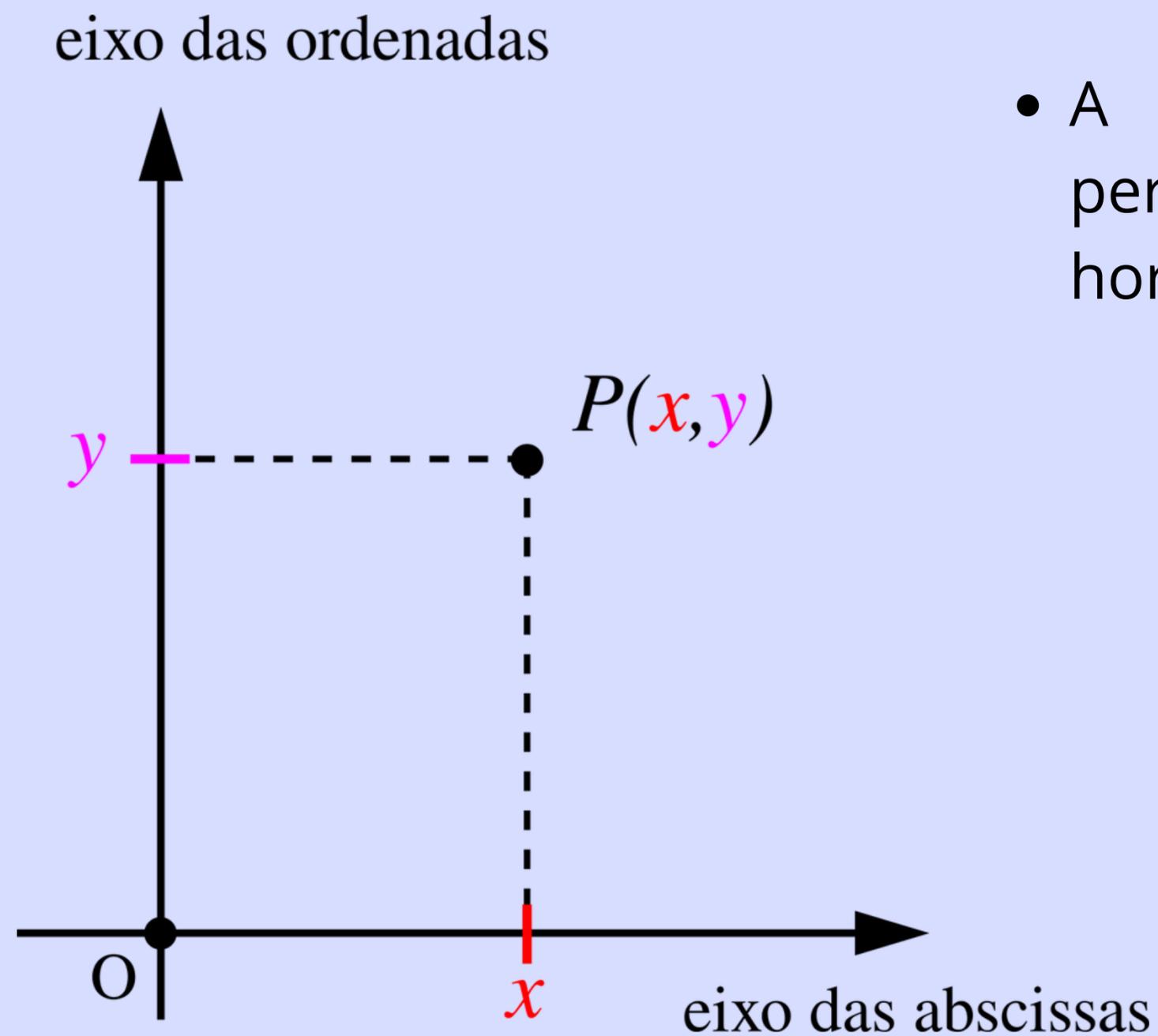


# Aula 0 - Revisão

<https://mmugnaine.github.io/eel/teaching/GA>

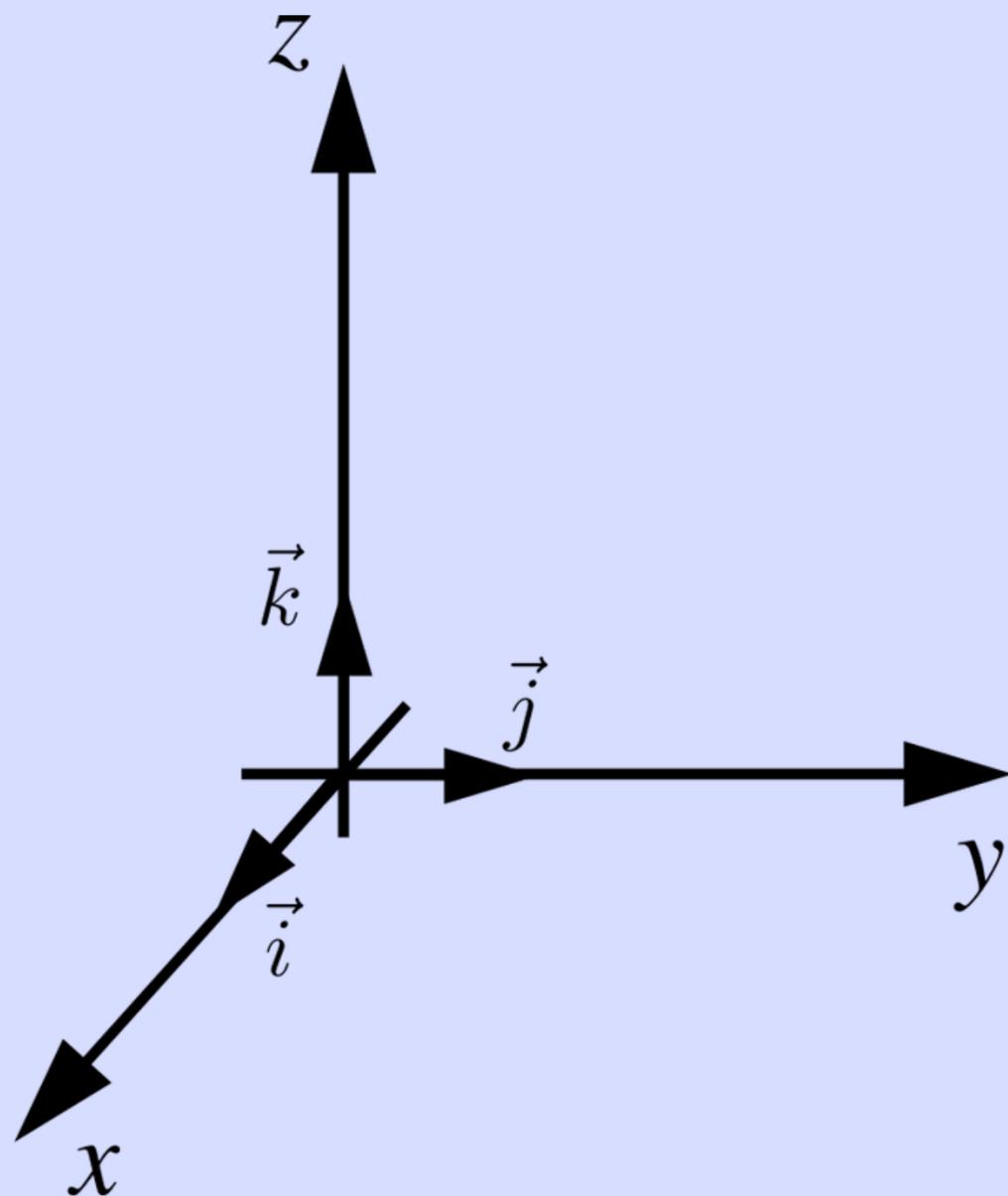


# Coordenadas cartesianas no plano



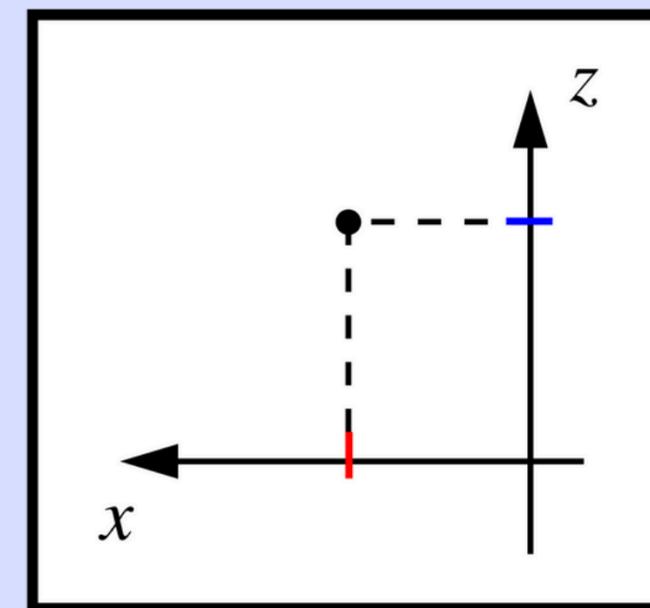
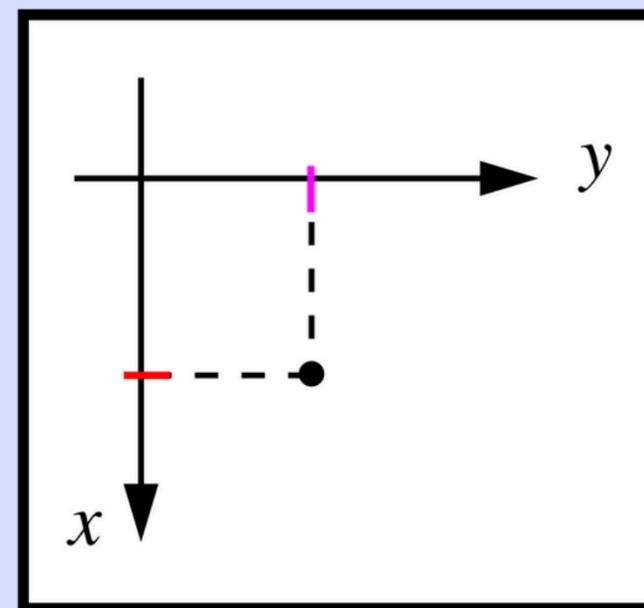
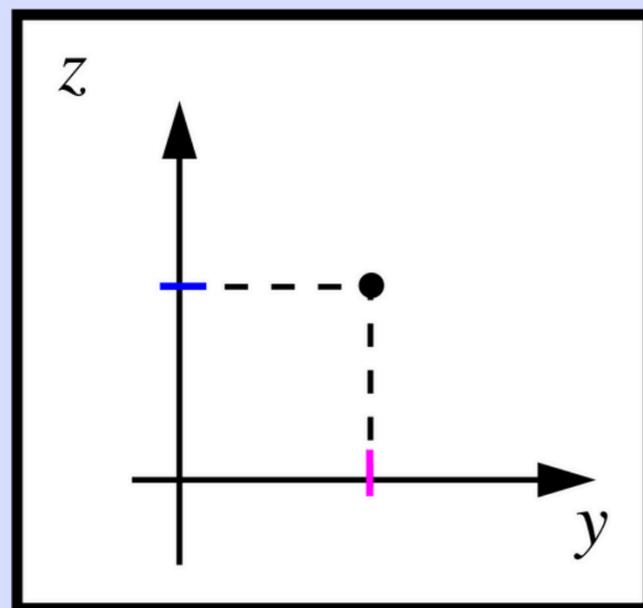
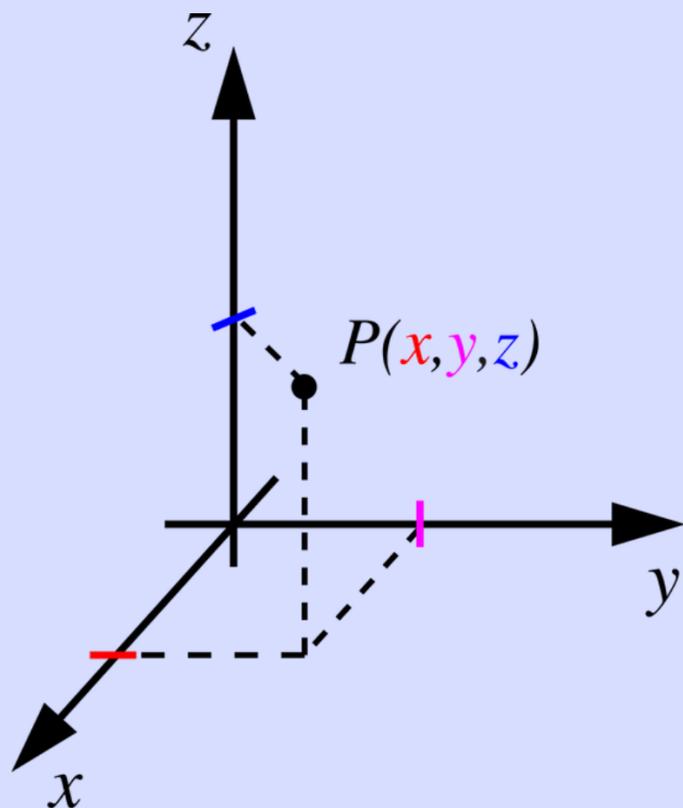
- A base do sistema são duas retas perpendiculares, onde uma reta é posta na horizontal e outra na vertical

# Coordenadas cartesianas no espaço



- Nesse caso, a base é formada por três retas perpendiculares entre si
- Três valores são necessários para determinar a posição de um ponto

# Coordenadas cartesianas no espaço



# Valor absoluto

$$|x| = \begin{cases} x, & \text{se } x \geq 0 \\ -x, & \text{se } x < 0 \end{cases}$$

$$|x| = \sqrt{x^2}$$

# Matrizes

- Matriz de ordem  $m \times n$ :  $m$  linhas e  $n$  colunas

$$A = \begin{pmatrix} a_{11} & a_{12} & \dots & a_{1\ n-1} & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2\ n-1} & a_{2n} \\ \vdots & \vdots & & \vdots & \vdots \\ a_{m-1\ 1} & a_{m-1\ 2} & \dots & a_{m-1\ n-1} & a_{m-1\ n} \\ a_{m1} & a_{m2} & \dots & a_{m\ n-1} & a_{mn} \end{pmatrix}$$

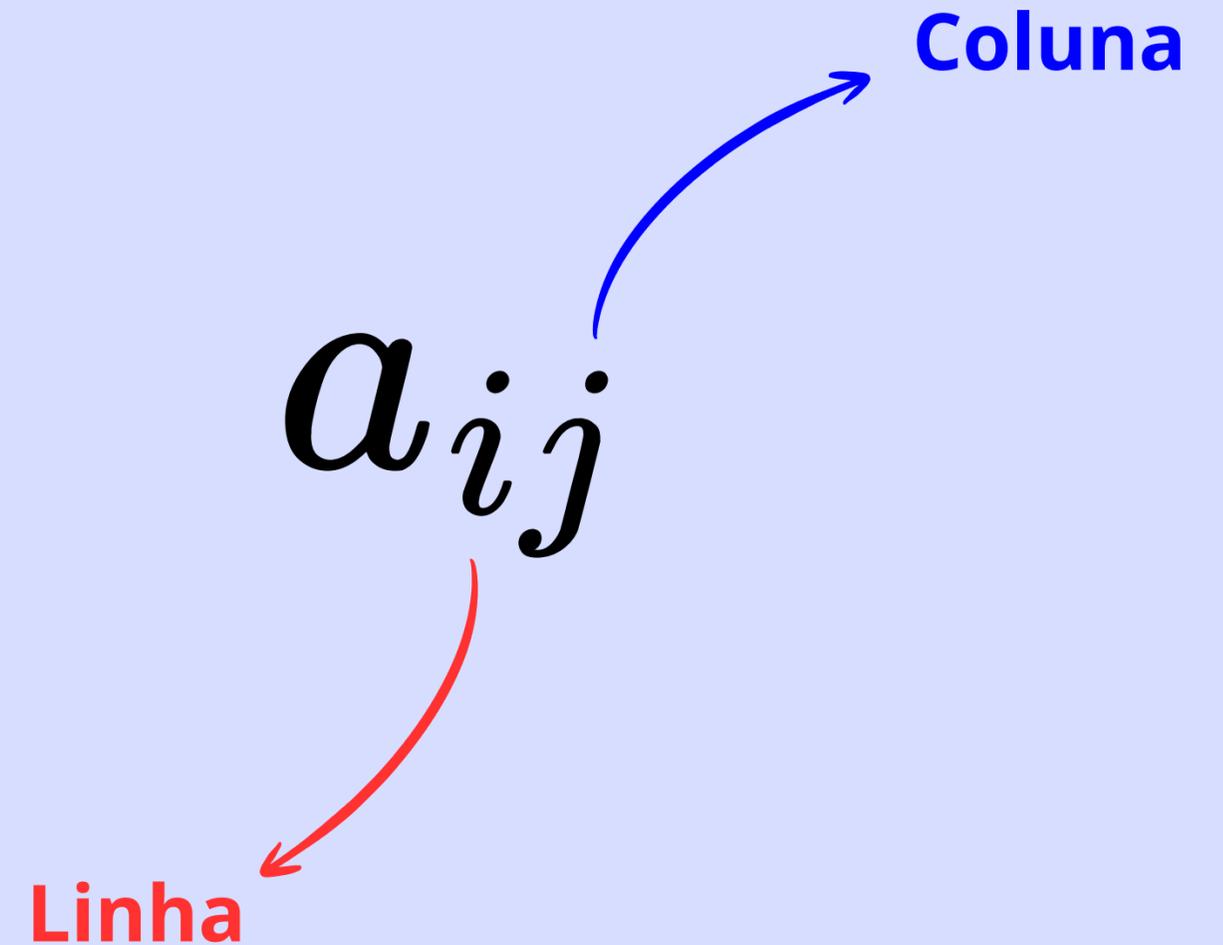
Linha 1  
Linha 2  
Linha  $m-1$   
Linha  $m$

Coluna 1  
Coluna 2  
Coluna  $n-1$   
Coluna  $n$

# Matrizes

- Elementos

$$A = \begin{pmatrix} a_{11} & a_{12} & \dots & a_{1\ n-1} & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2\ n-1} & a_{2n} \\ \vdots & \vdots & & \vdots & \vdots \\ a_{m-1\ 1} & a_{m-1\ 2} & \dots & a_{m-1\ n-1} & a_{m-1\ n} \\ a_{m1} & a_{m2} & \dots & a_{m\ n-1} & a_{mn} \end{pmatrix}$$



# Matrizes

## Matriz quadrada

$$A = \begin{pmatrix} 1 & 0 & 2 \\ 3 & -4 & 9 \\ 5 & 8 & 7 \end{pmatrix}$$

## Matriz linha

$$A = (a \ b \ c \ d)$$

## Matriz triangular superior

$$A = \begin{pmatrix} a & b & c \\ 0 & d & e \\ 0 & 0 & f \end{pmatrix}$$

## Matriz nula

$$A = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$$

## Matriz diagonal

$$A = \begin{pmatrix} x & 0 & 0 \\ 0 & z & 0 \\ 0 & 0 & xy \end{pmatrix}$$

## Matriz triangular inferior

$$A = \begin{pmatrix} -1 & 0 & 0 \\ 2 & -7 & 0 \\ 5 & 8 & 9 \end{pmatrix}$$

## Matriz coluna

$$A = \begin{pmatrix} x \\ y \\ z \end{pmatrix}$$

## Matriz identidade

$$A = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

## Matriz simétrica

$$A = \begin{pmatrix} 1 & -1 & 5 \\ -1 & 3 & 7 \\ 5 & 7 & 4 \end{pmatrix}$$

# Matrizes

- **Igualdade**

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} x & y \\ z & w \end{pmatrix} \rightarrow \begin{cases} a = x \\ b = y \\ c = z \\ d = w \end{cases}$$

- **Adição**

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix} + \begin{pmatrix} x & y \\ z & w \end{pmatrix} = \begin{pmatrix} a + x & b + y \\ c + z & d + w \end{pmatrix}$$

- **Multiplicação por escalar**

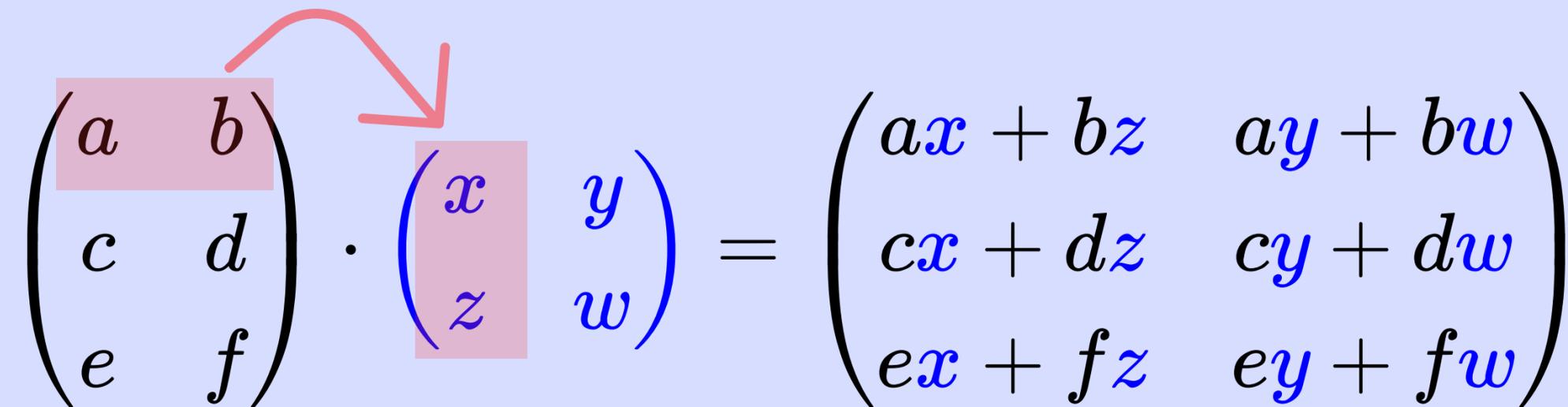
$$3 \begin{pmatrix} x & 0 & a \\ y & z & b \\ 0 & w & d \end{pmatrix} = \begin{pmatrix} 3x & 0 & 3a \\ 3y & 3z & 3b \\ 0 & 3w & 3d \end{pmatrix}$$

- **Transposição**

$$A = \begin{pmatrix} 2 & 1 \\ 0 & 3 \\ -1 & 4 \end{pmatrix} \rightarrow A' = \begin{pmatrix} 2 & 0 & -1 \\ 1 & 3 & 4 \end{pmatrix}$$

# Matrizes

- **Multiplicação**



The diagram illustrates the multiplication of two matrices. The first matrix is  $\begin{pmatrix} a & b \\ c & d \\ e & f \end{pmatrix}$  and the second is  $\begin{pmatrix} x & y \\ z & w \end{pmatrix}$ . The elements  $a$  and  $b$  in the first row of the first matrix are highlighted in a pink box. The elements  $x$  and  $z$  in the first column of the second matrix are also highlighted in a pink box. A red arrow points from the top-right corner of the first pink box to the top-left corner of the second pink box, indicating the dot product of the first row of the first matrix and the first column of the second matrix. The result of this multiplication is the first element of the resulting matrix,  $ax + bz$ , which is highlighted in blue. The full resulting matrix is  $\begin{pmatrix} ax + bz & ay + bw \\ cx + dz & cy + dw \\ ex + fz & ey + fw \end{pmatrix}$ .

$$\begin{pmatrix} a & b \\ c & d \\ e & f \end{pmatrix} \cdot \begin{pmatrix} x & y \\ z & w \end{pmatrix} = \begin{pmatrix} ax + bz & ay + bw \\ cx + dz & cy + dw \\ ex + fz & ey + fw \end{pmatrix}$$

- Só podemos efetuar o produto de duas matrizes se o número de colunas da primeira matriz for igual ao número de linhas da segunda

# Determinante

- Número associado a uma matriz quadrada  $A$  representado por  $\det A$  ou  $|A|$ .

$$A = (x) \rightarrow \det A = |A| = x$$

$$A = \begin{pmatrix} a & b \\ c & d \end{pmatrix} \rightarrow \det A = \begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - cb$$

# Determinante

$$A = \begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix}$$

$$|A| = \begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix} = aei + bfg + cdh - gec - hfa - idb$$

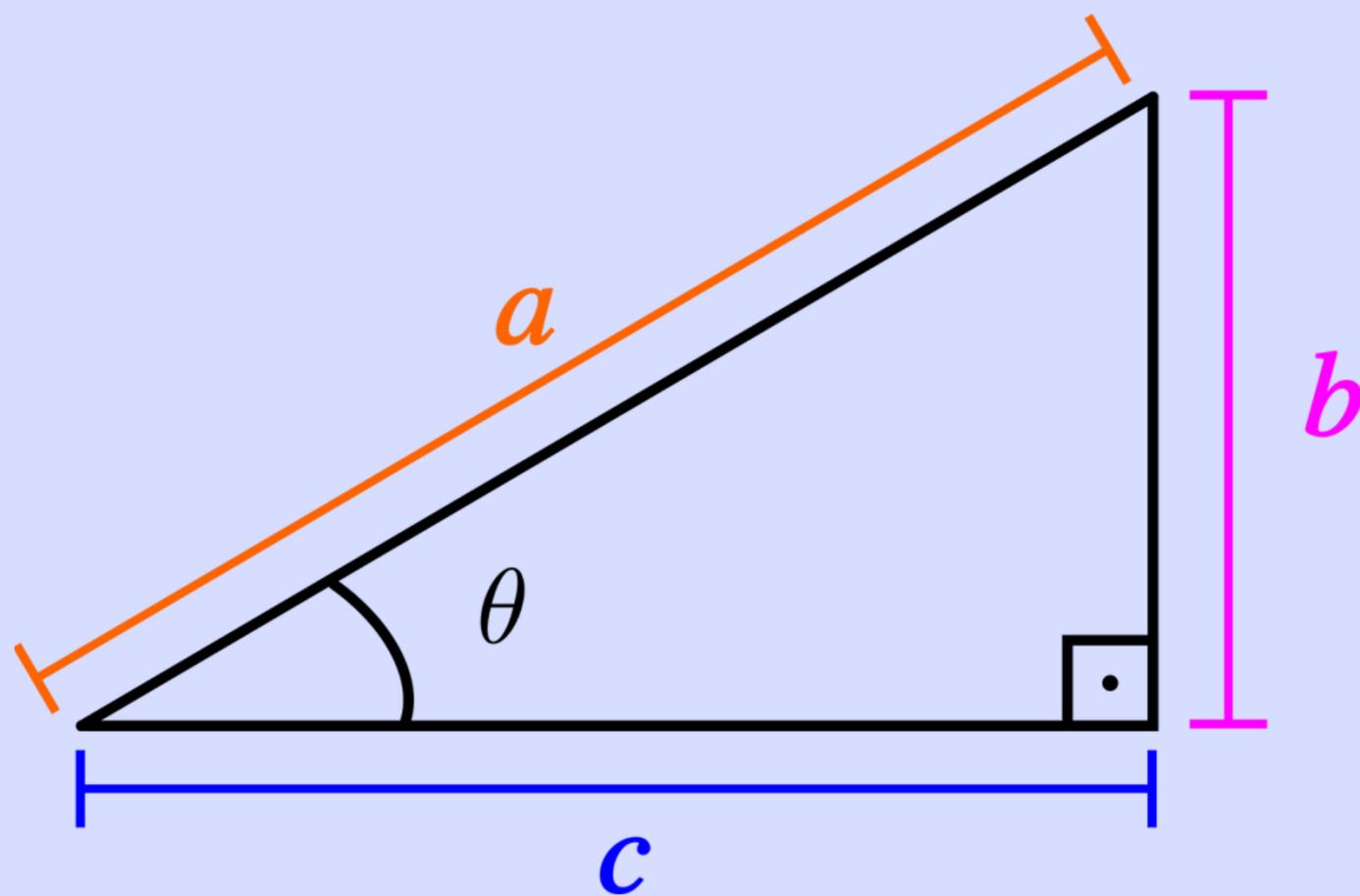
# Determinante

$$A = \begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix}$$

$$|A| = \begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix} = aei + bfg + cdh - gec - hfa - idb$$

# Trigonometria

- Triângulo retângulo



$$\text{sen } \theta = \frac{b}{a}$$

$$\text{cos } \theta = \frac{c}{a}$$

$$\text{tg } \theta = \frac{\text{sen } \theta}{\text{cos } \theta} = \frac{b}{c}$$

$$\text{sen}^2 \theta + \text{cos}^2 \theta = 1$$

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