

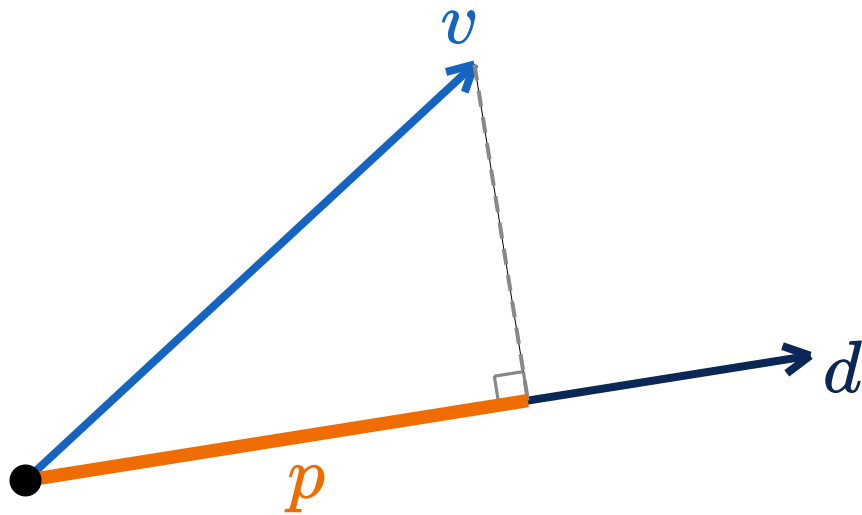
# Convexidad & Dualidad

Charles

Training Camp

Medellin 2026

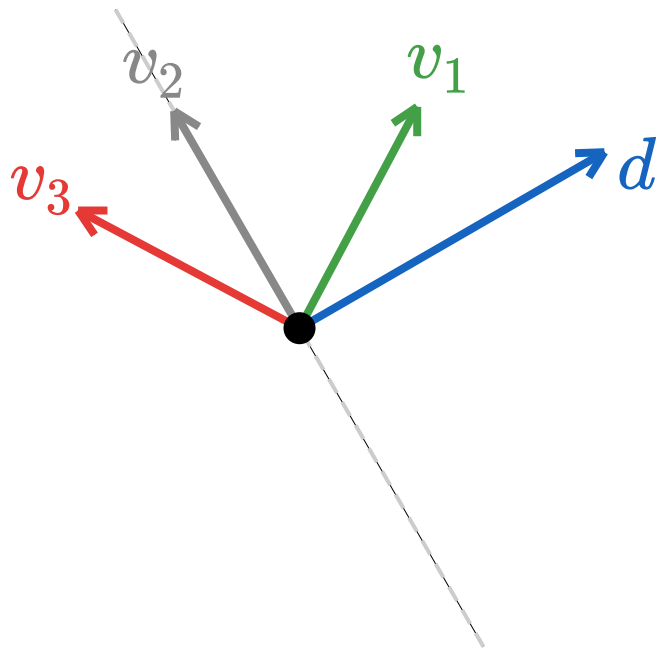
# Producto Interno



$$\langle v, d \rangle = p \cdot \|d\|$$

$$\langle v, d \rangle = v_x \cdot d_x + v_y \cdot d_y$$

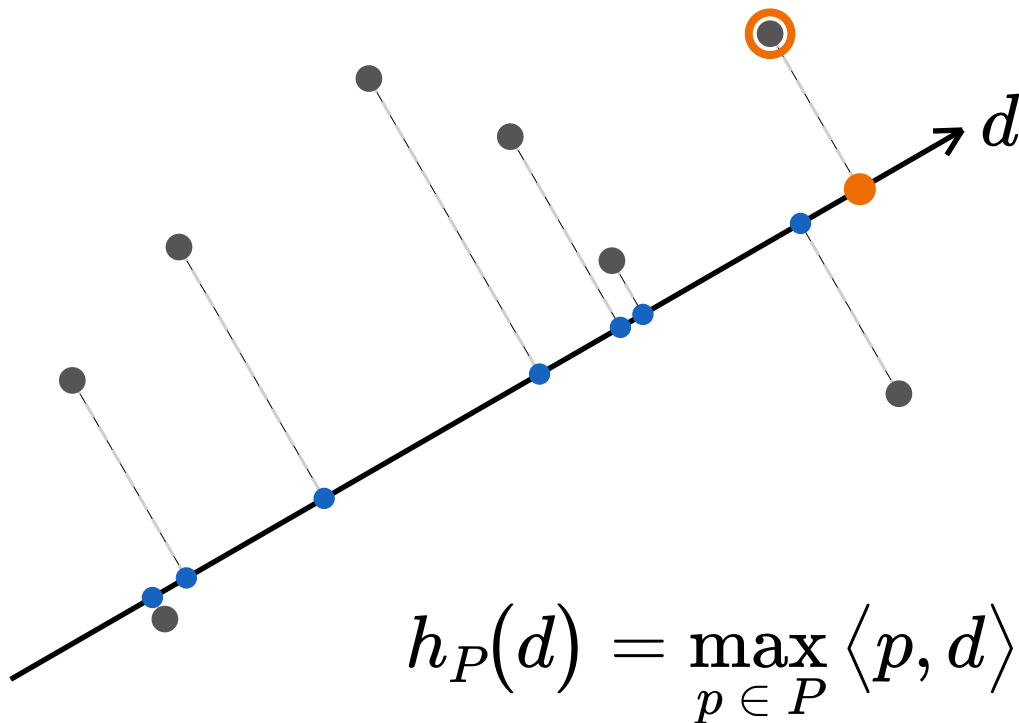
# Signo del Producto Interno



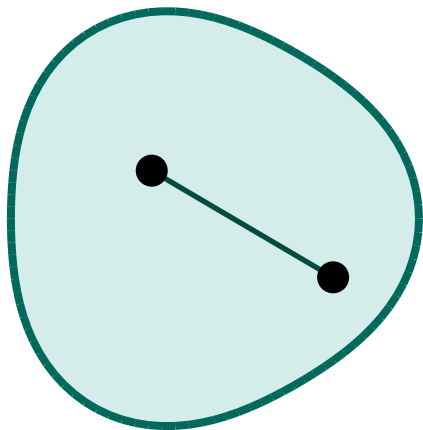
$$\langle v_1, d \rangle > 0$$

$$\langle v_2, d \rangle = 0$$

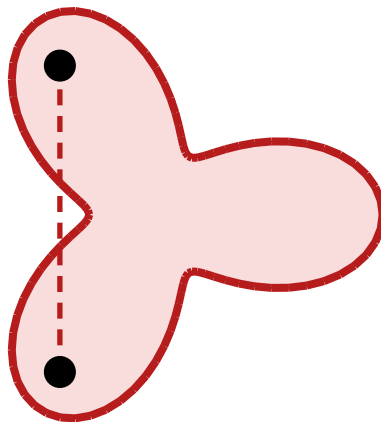
$$\langle v_3, d \rangle < 0$$



# Convexidad

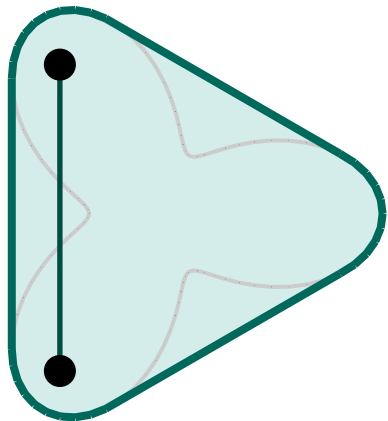
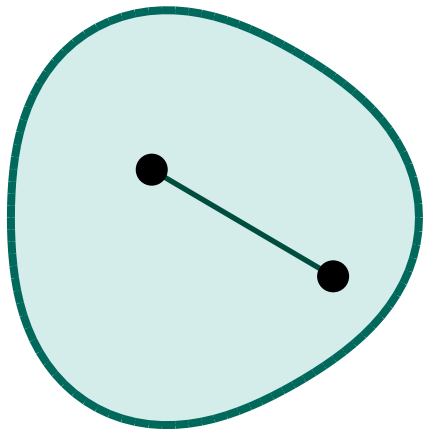


Convexo



No convexo

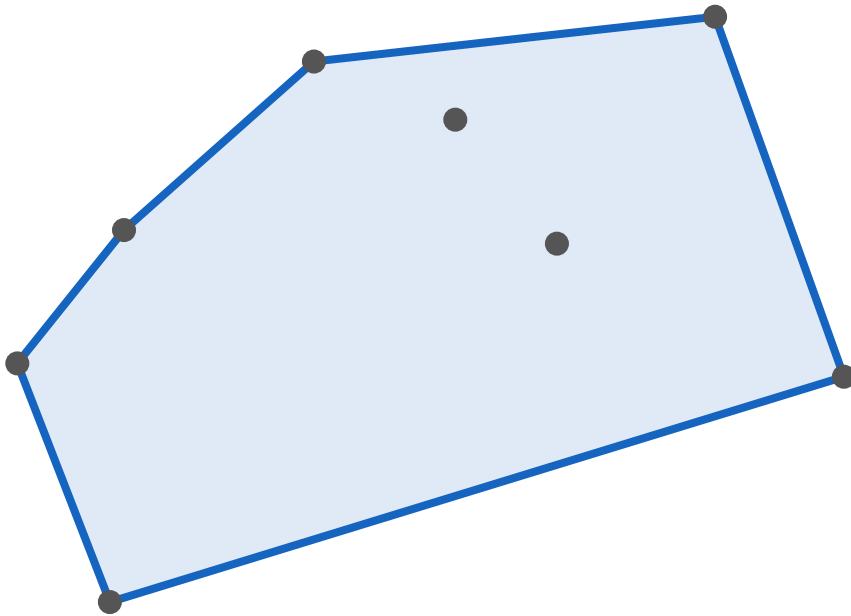
# Convex Hull



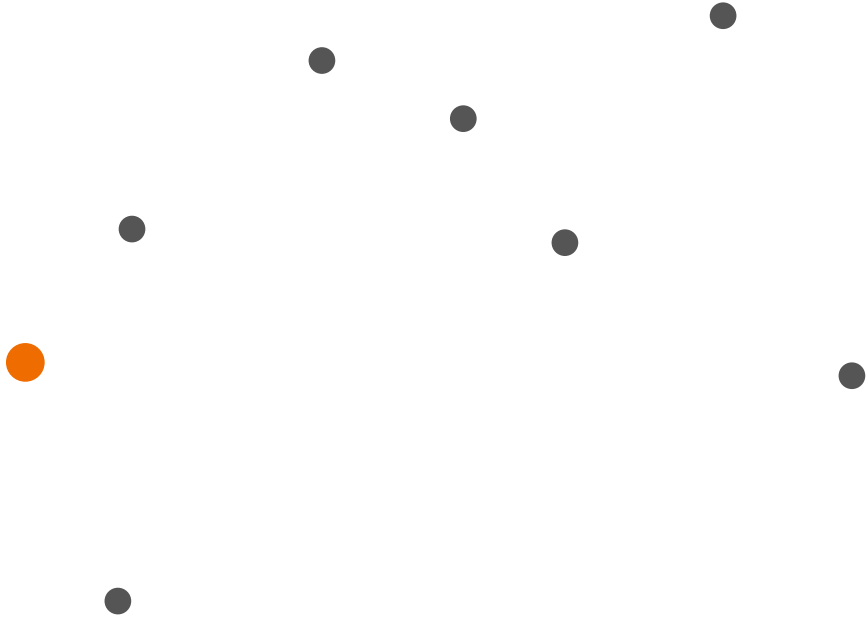
# Convex Hull



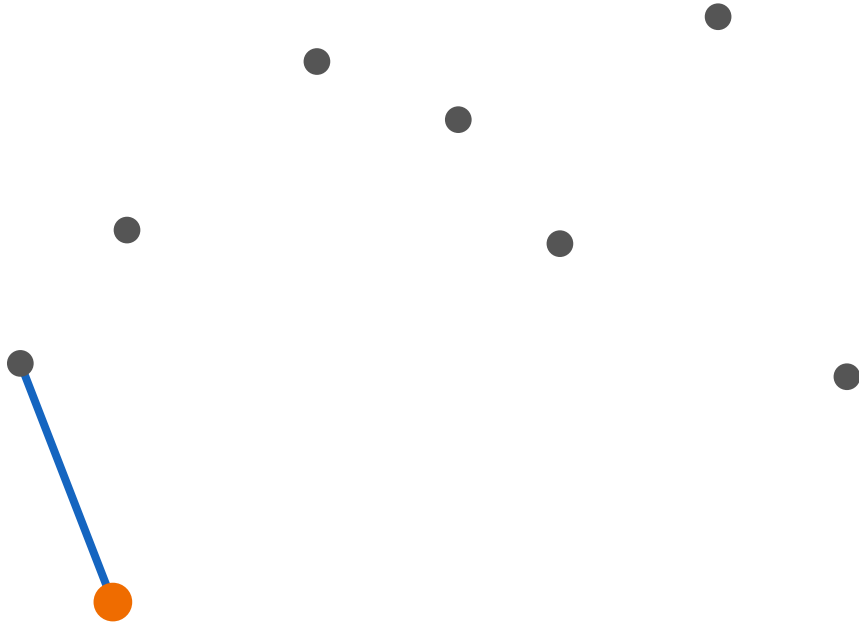
# Convex Hull



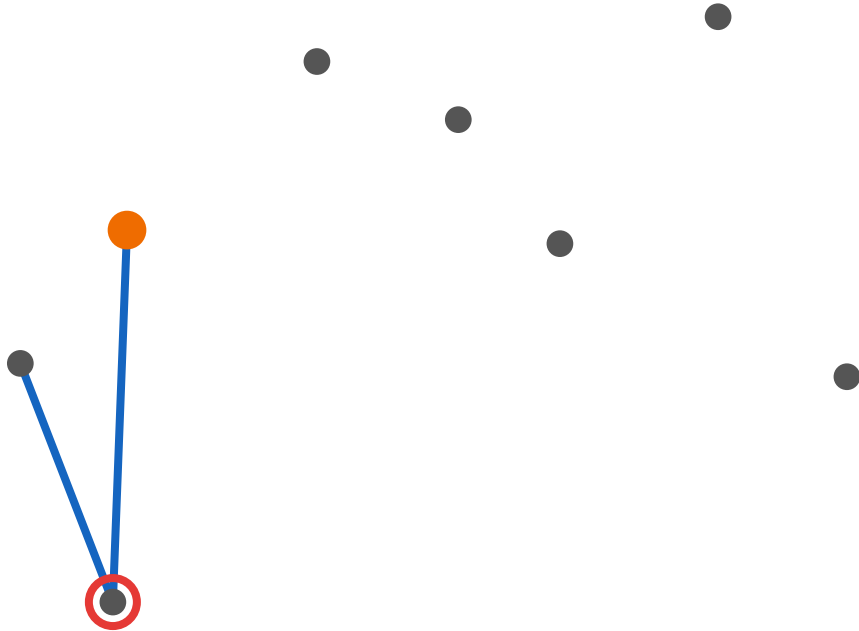
# Andrew's Algorithm



# Andrew's Algorithm



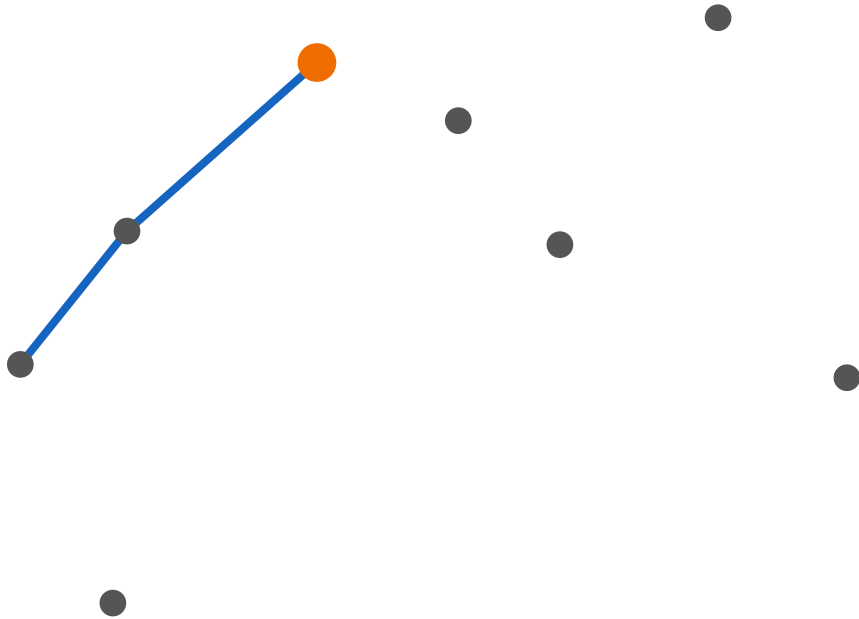
# Andrew's Algorithm



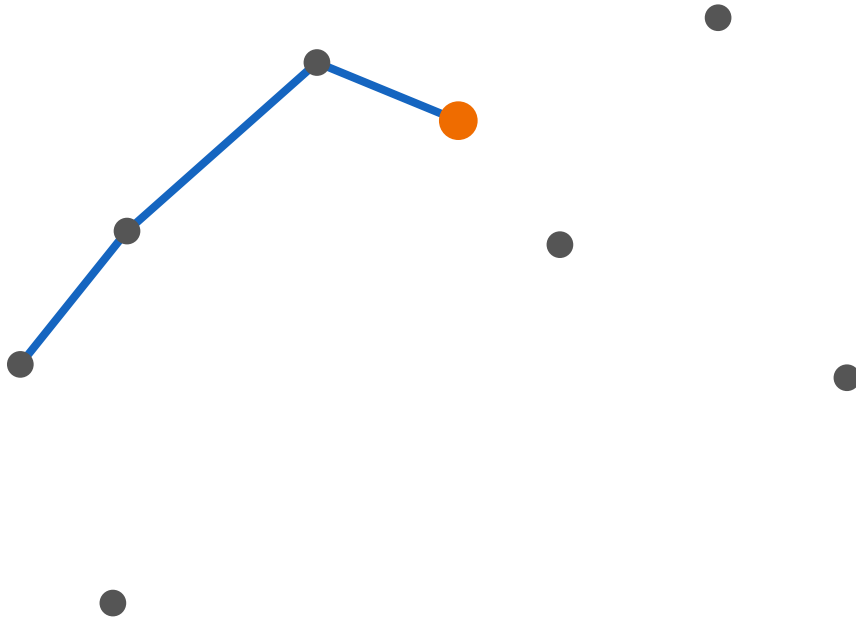
# Andrew's Algorithm



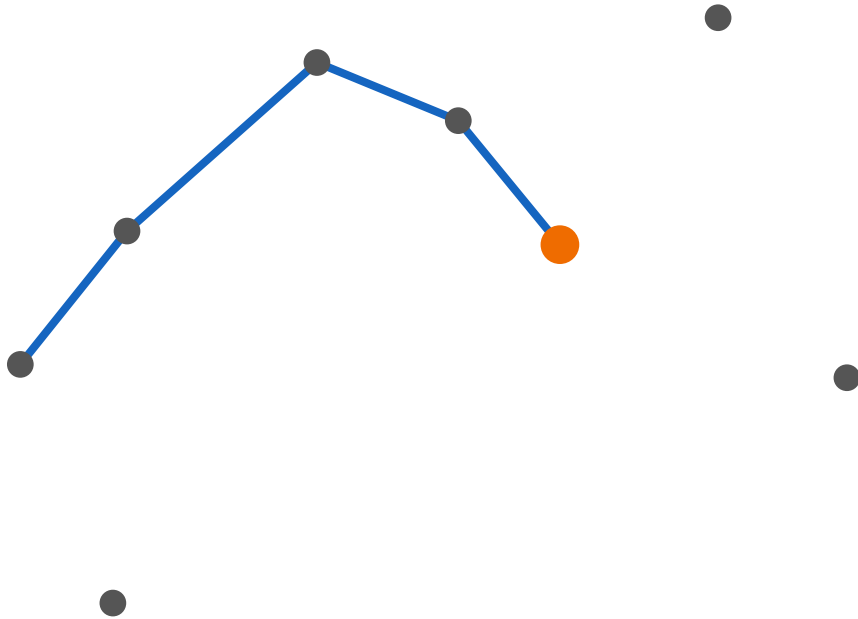
# Andrew's Algorithm



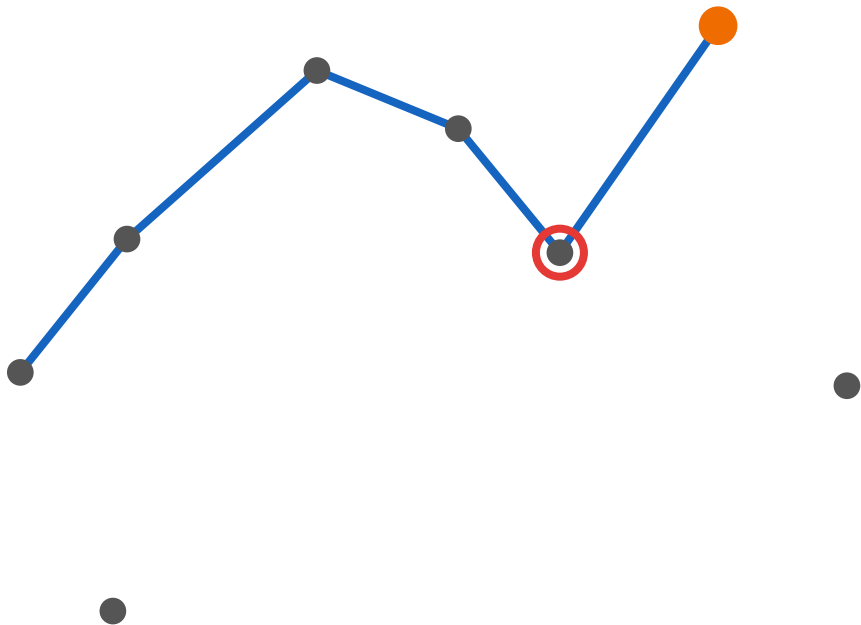
# Andrew's Algorithm



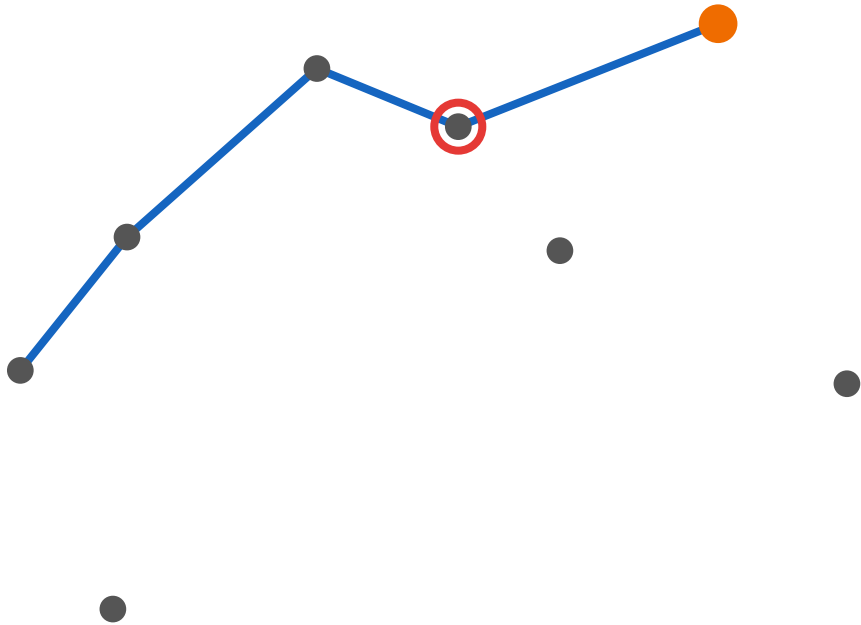
# Andrew's Algorithm



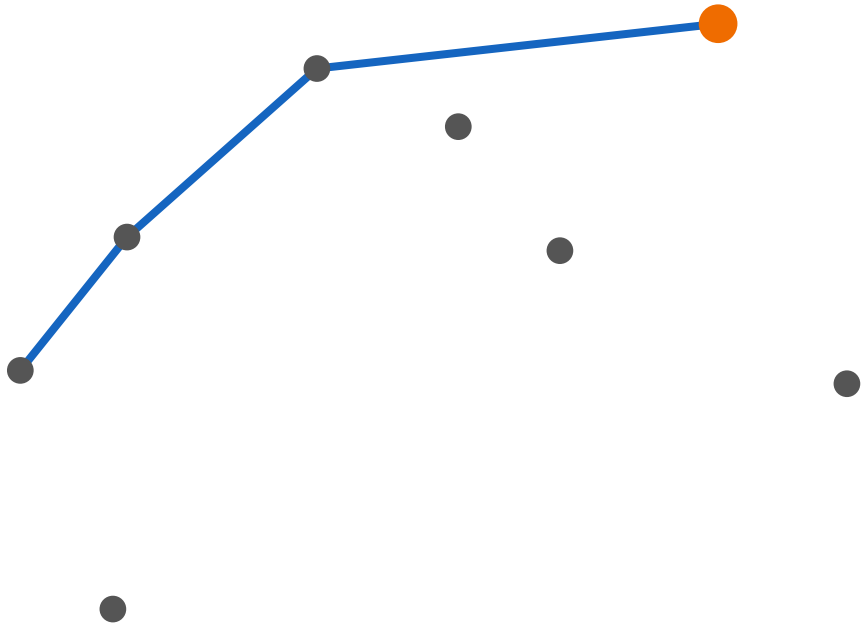
# Andrew's Algorithm



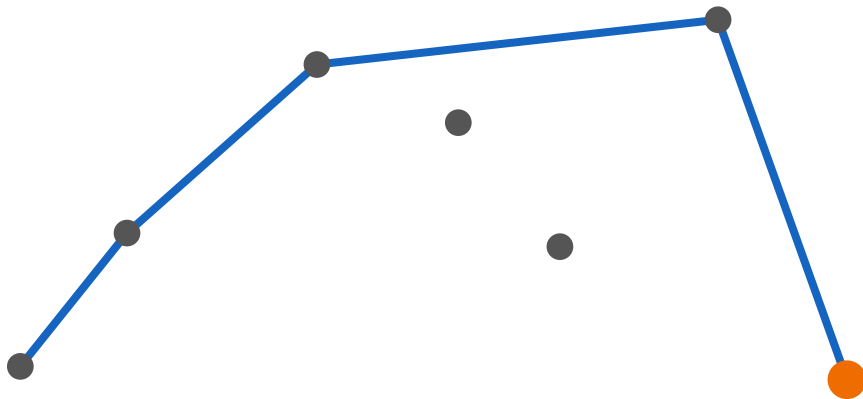
# Andrew's Algorithm



# Andrew's Algorithm

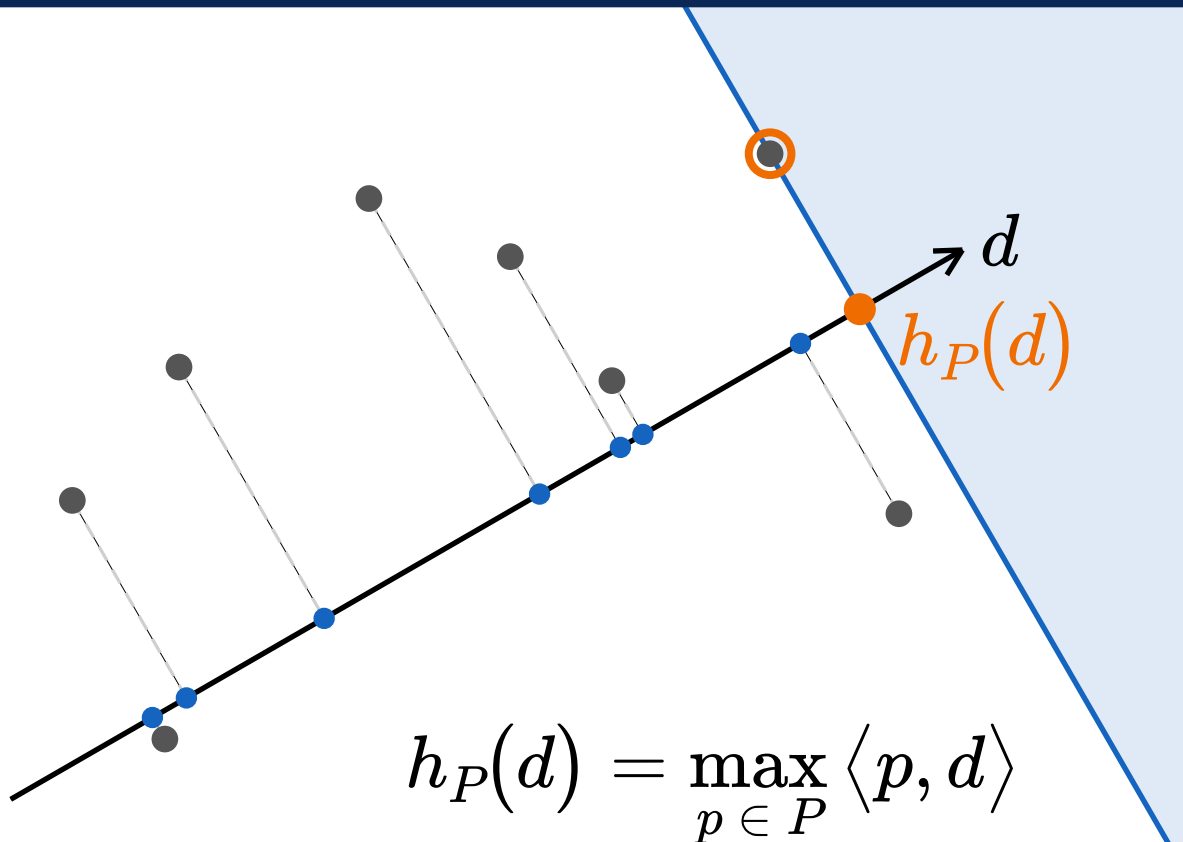


# Andrew's Algorithm

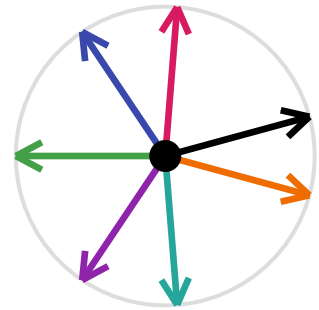
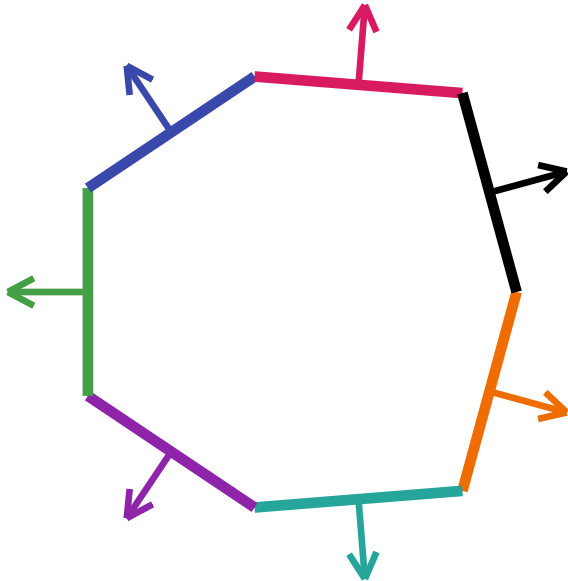


Fin.

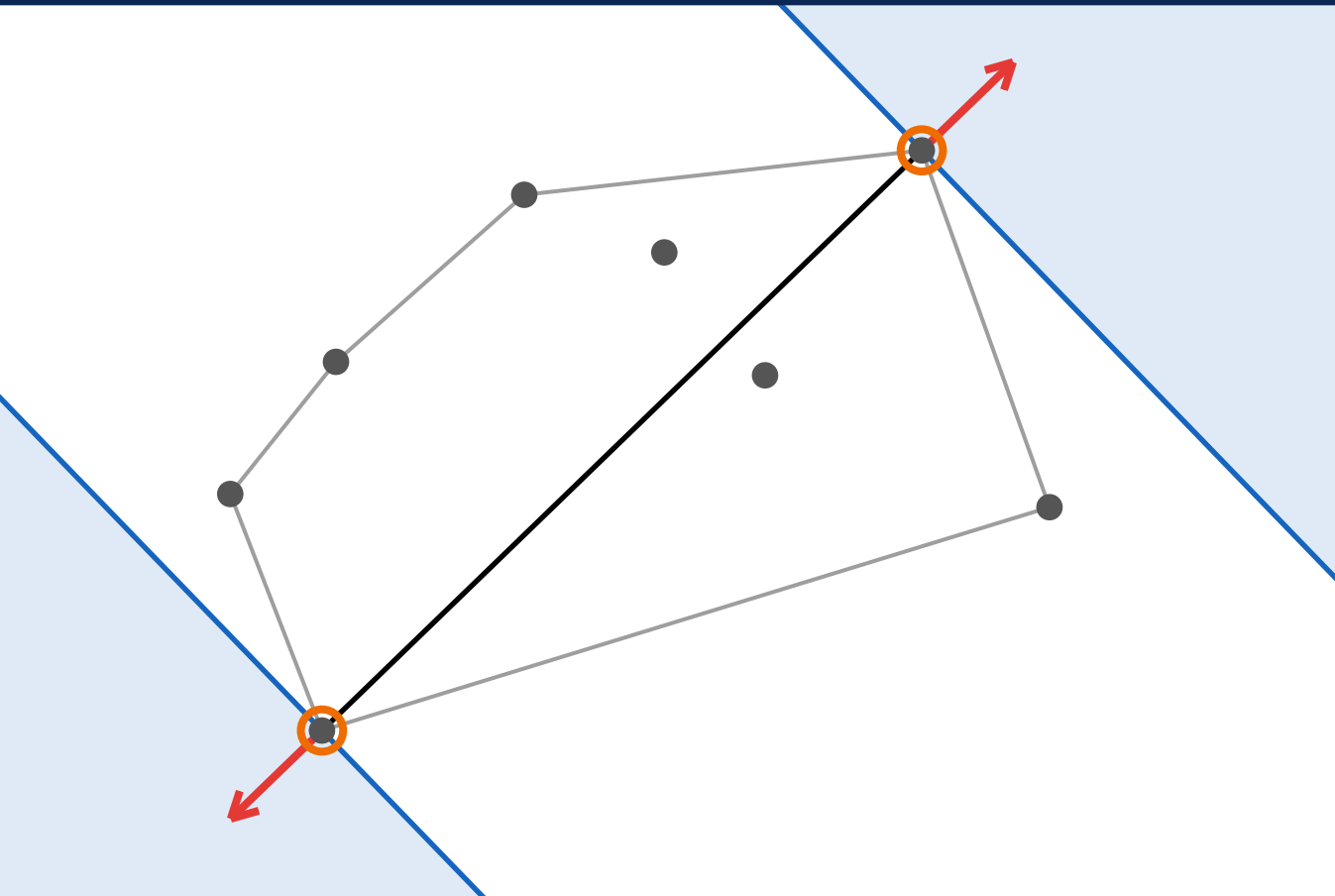
# Funcion de Soporte



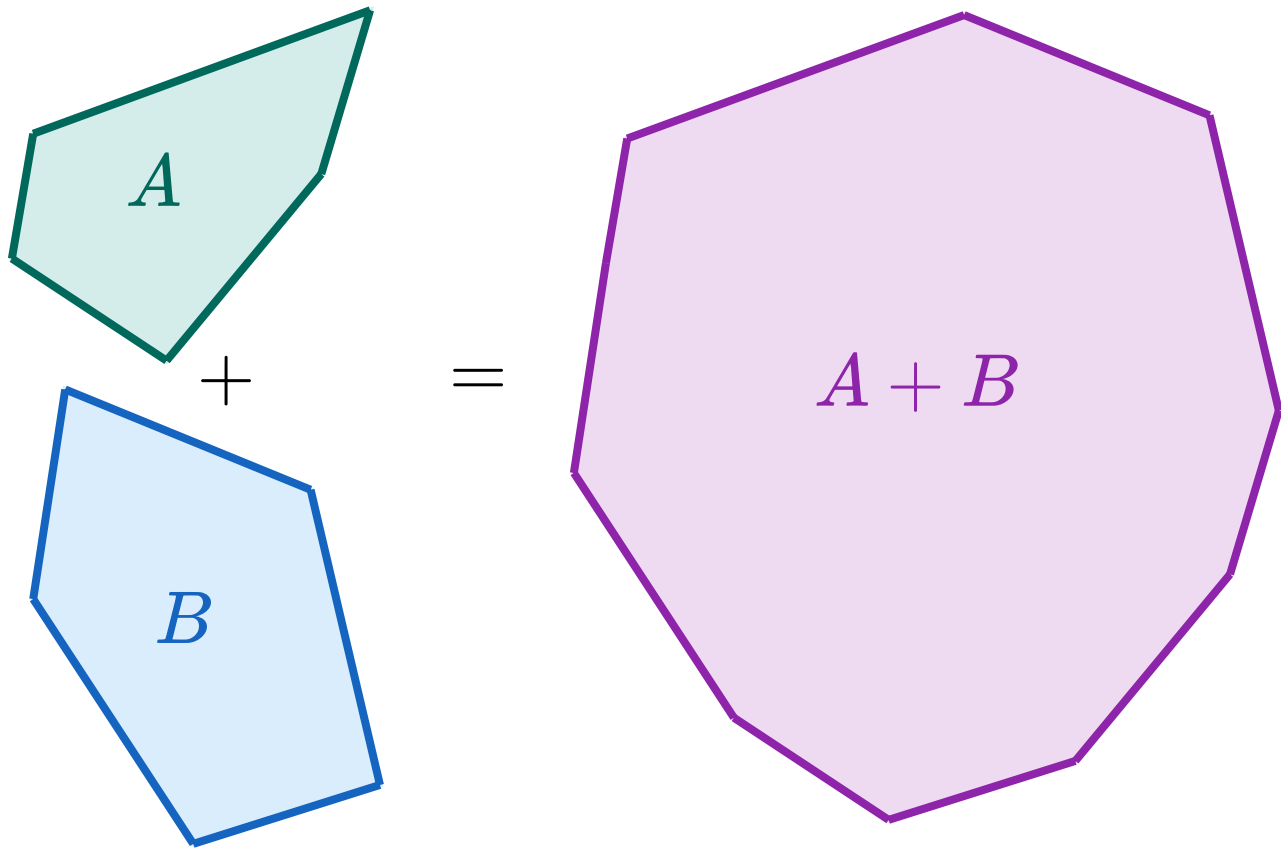
# Normales



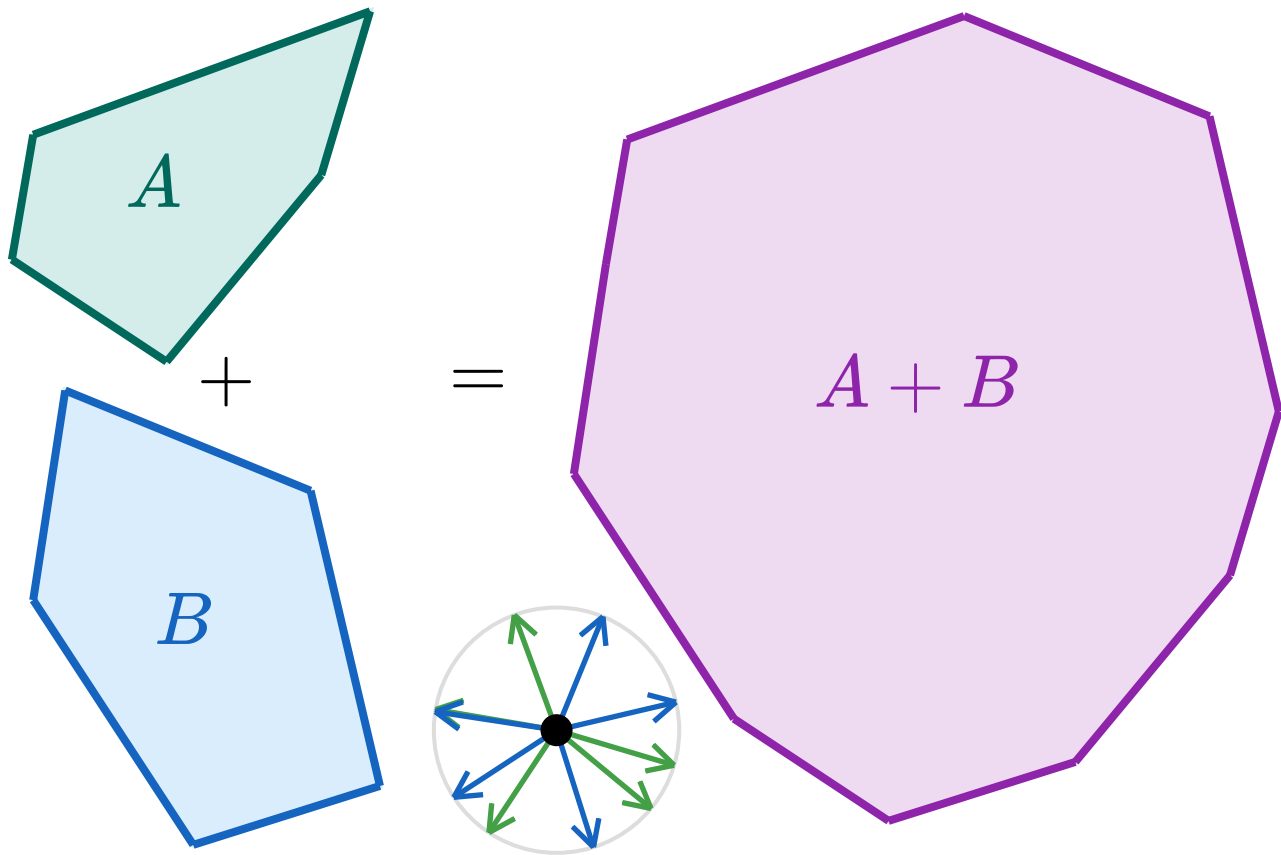
# Calipers



# Suma de Minkowski



# Suma de Minkowski

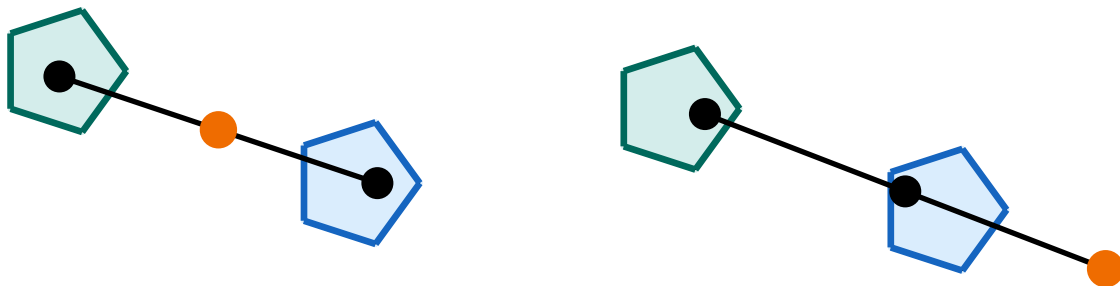


# Ejemplo

Se dan dos poligonos convexos  $A$  y  $B$ , y  $n$  estaciones (puntos)

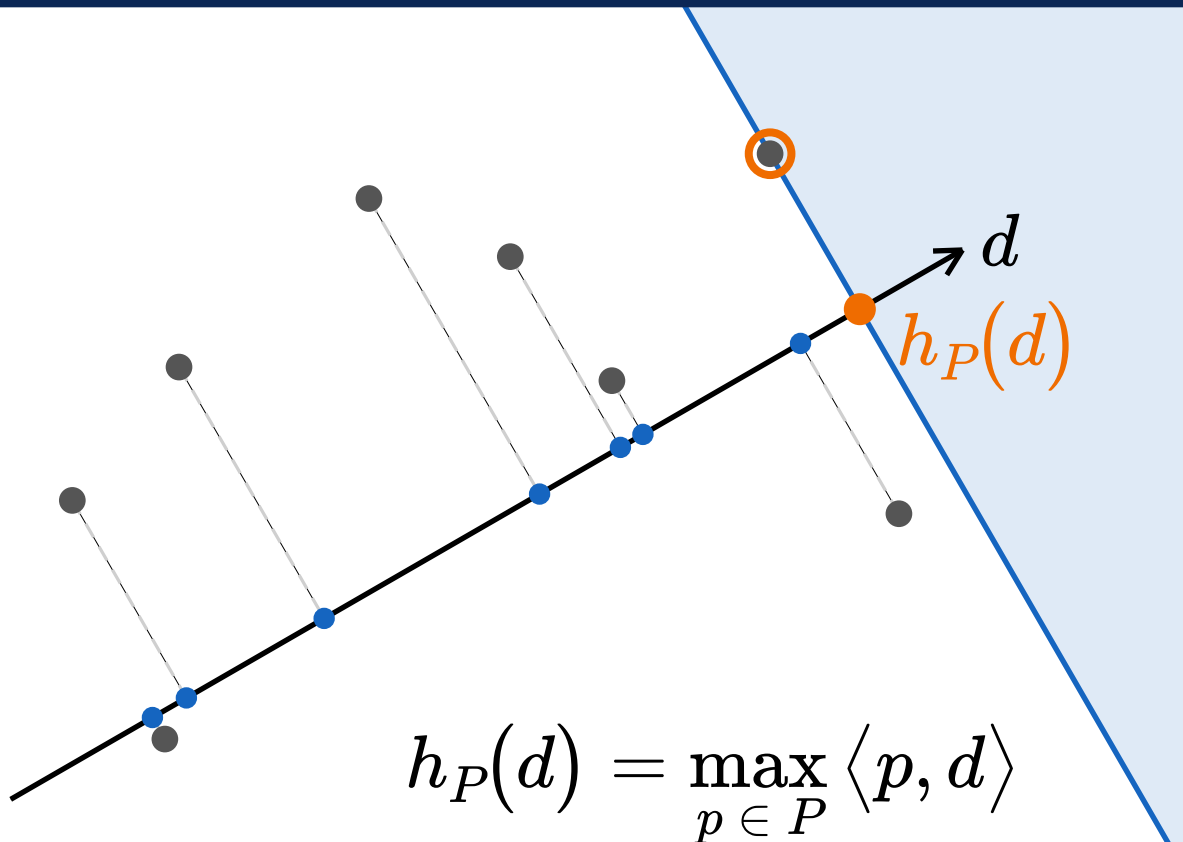
Se te pide encontrar para cada estacion  $p$  si existen puntos

$a \in A, b \in B$  tales que  $a, b, p$  formen una tripla valida

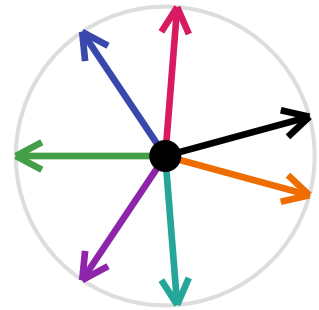
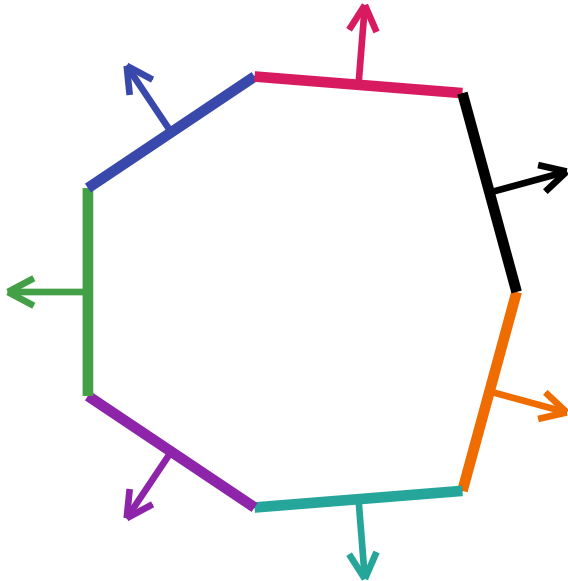


# Break

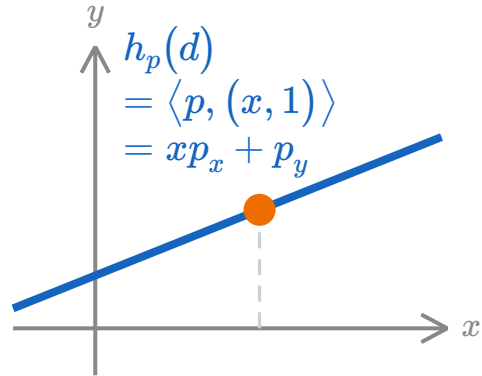
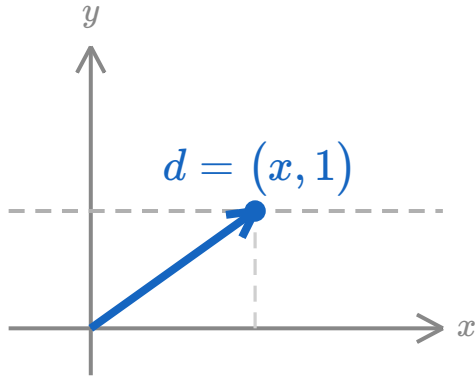
10 min



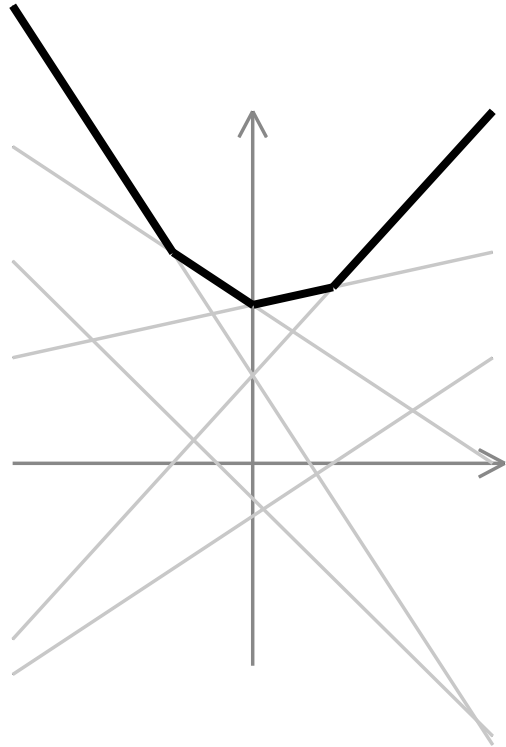
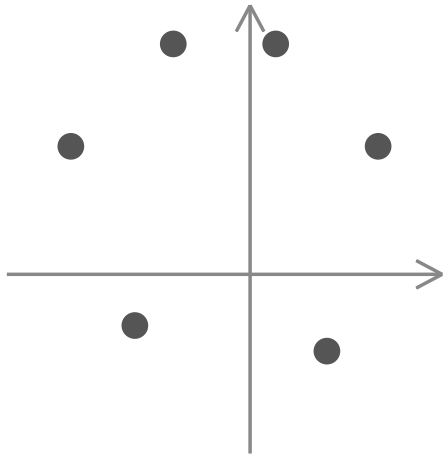
# Dualidad



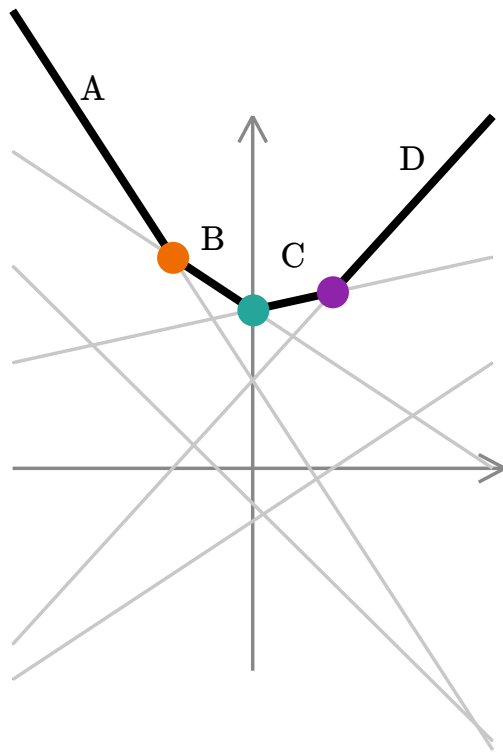
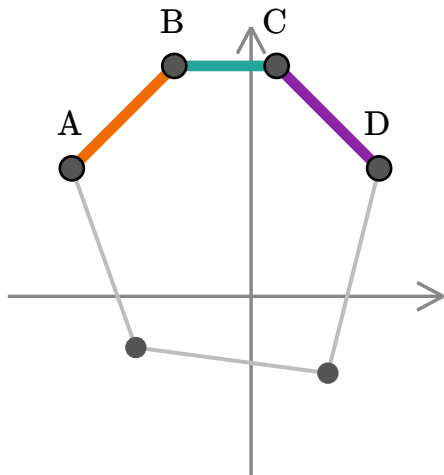
# Dualidad



# Dualidad



# Dualidad

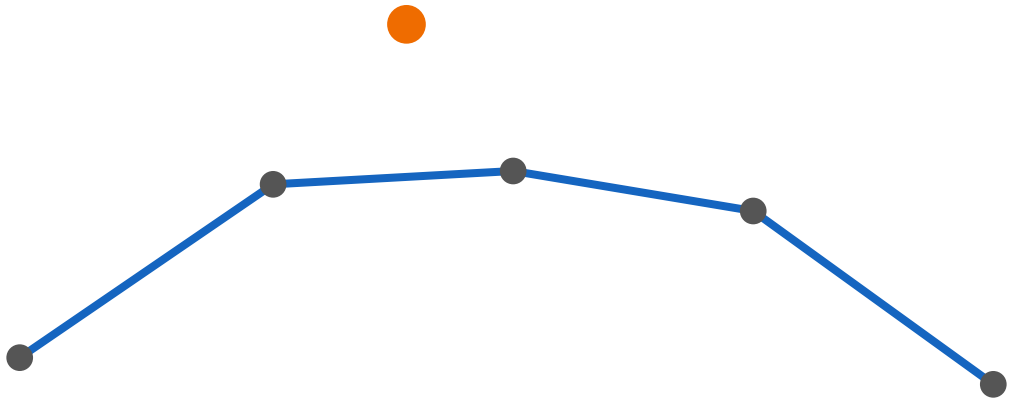


## Ejemplo

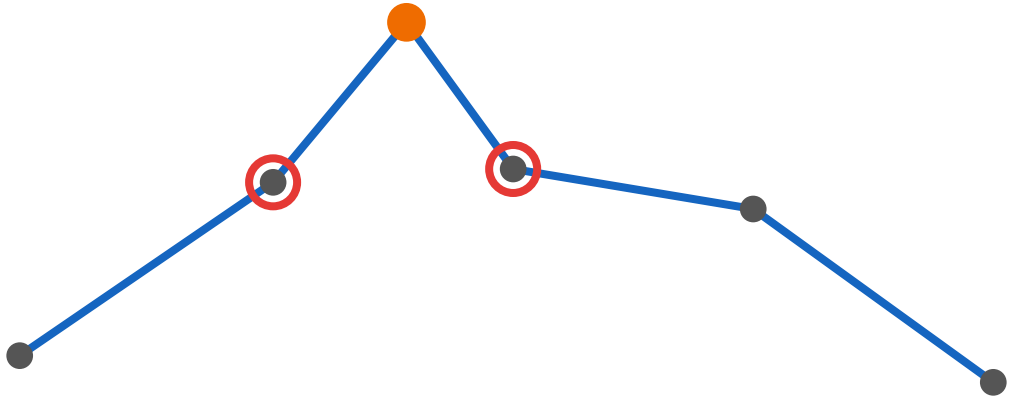
El valor de un array  $A$  es  $\sum_{i=0}^n iA_i$

Se da un array inicial  $A$ , mover un elemento para maximizar el valor del array resultante

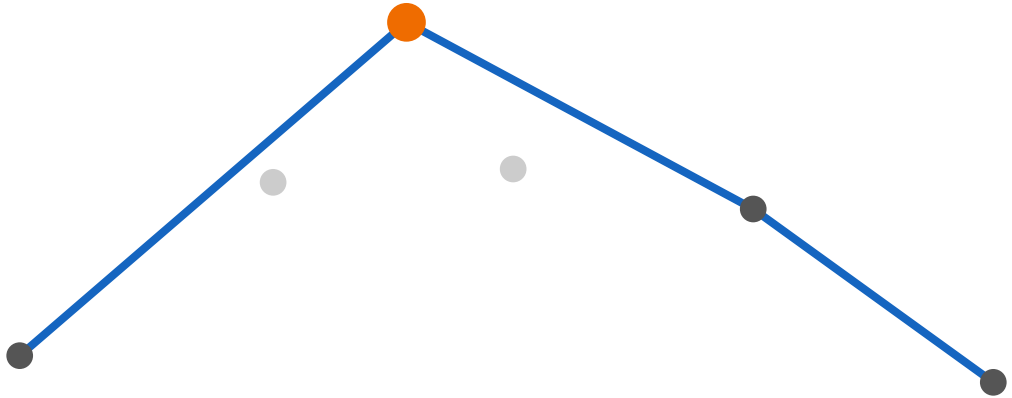
# Insercion en el Medio



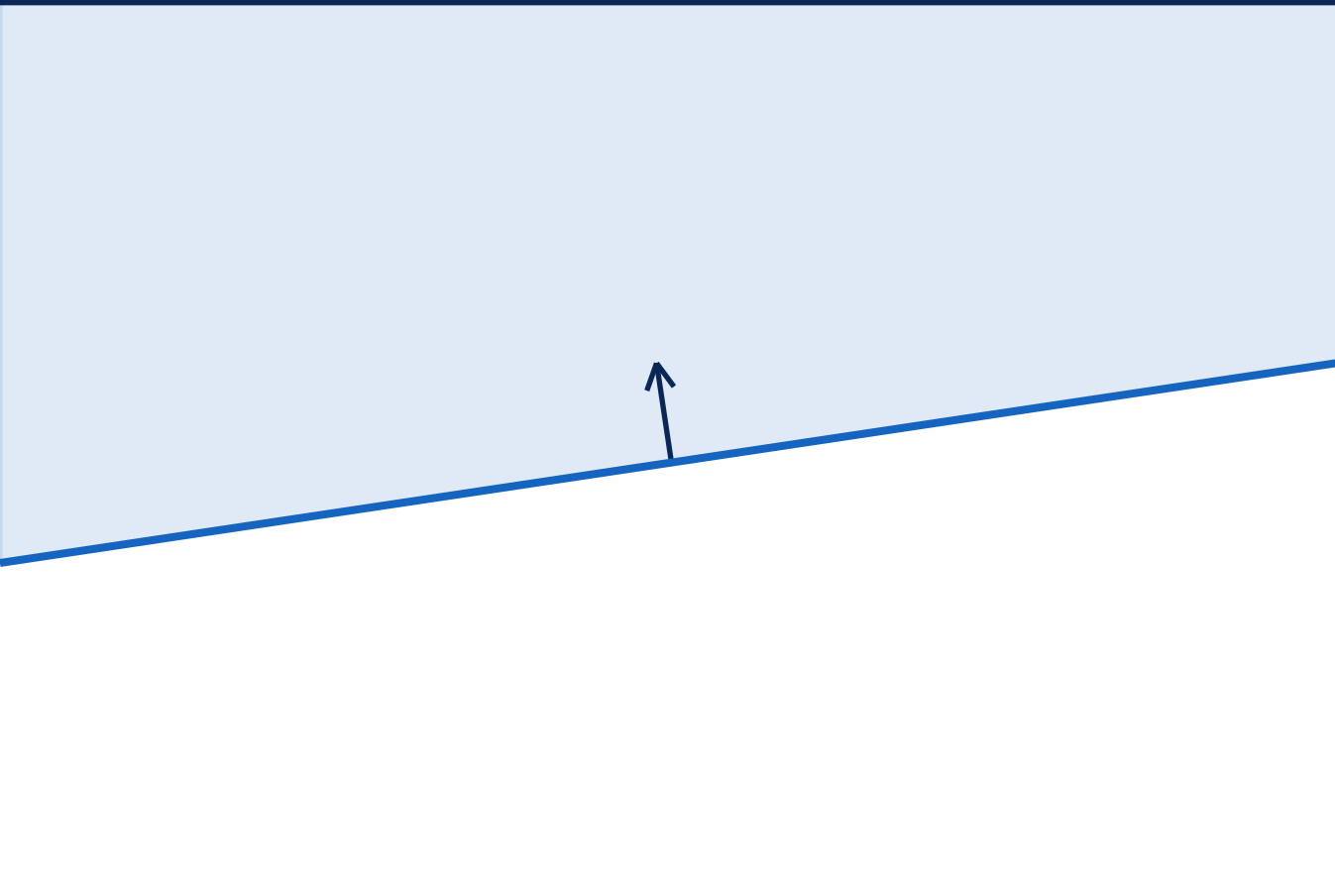
# Insercion en el Medio



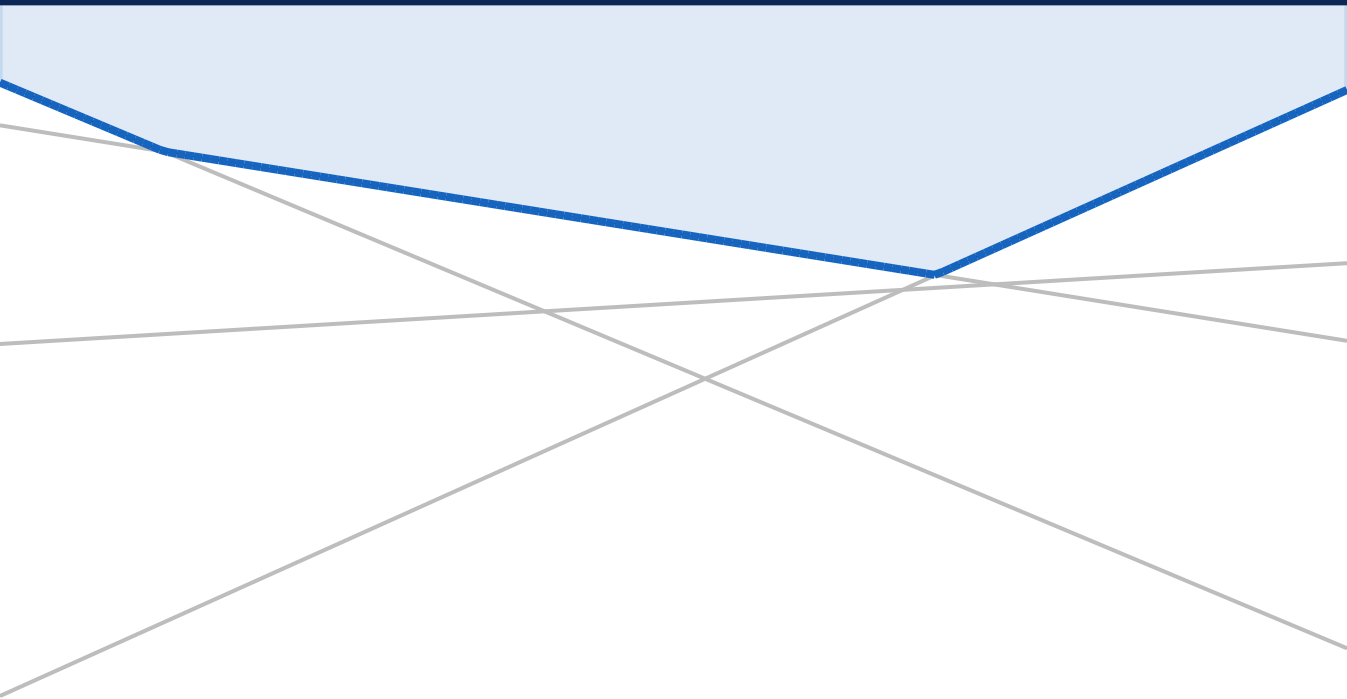
# Insercion en el Medio



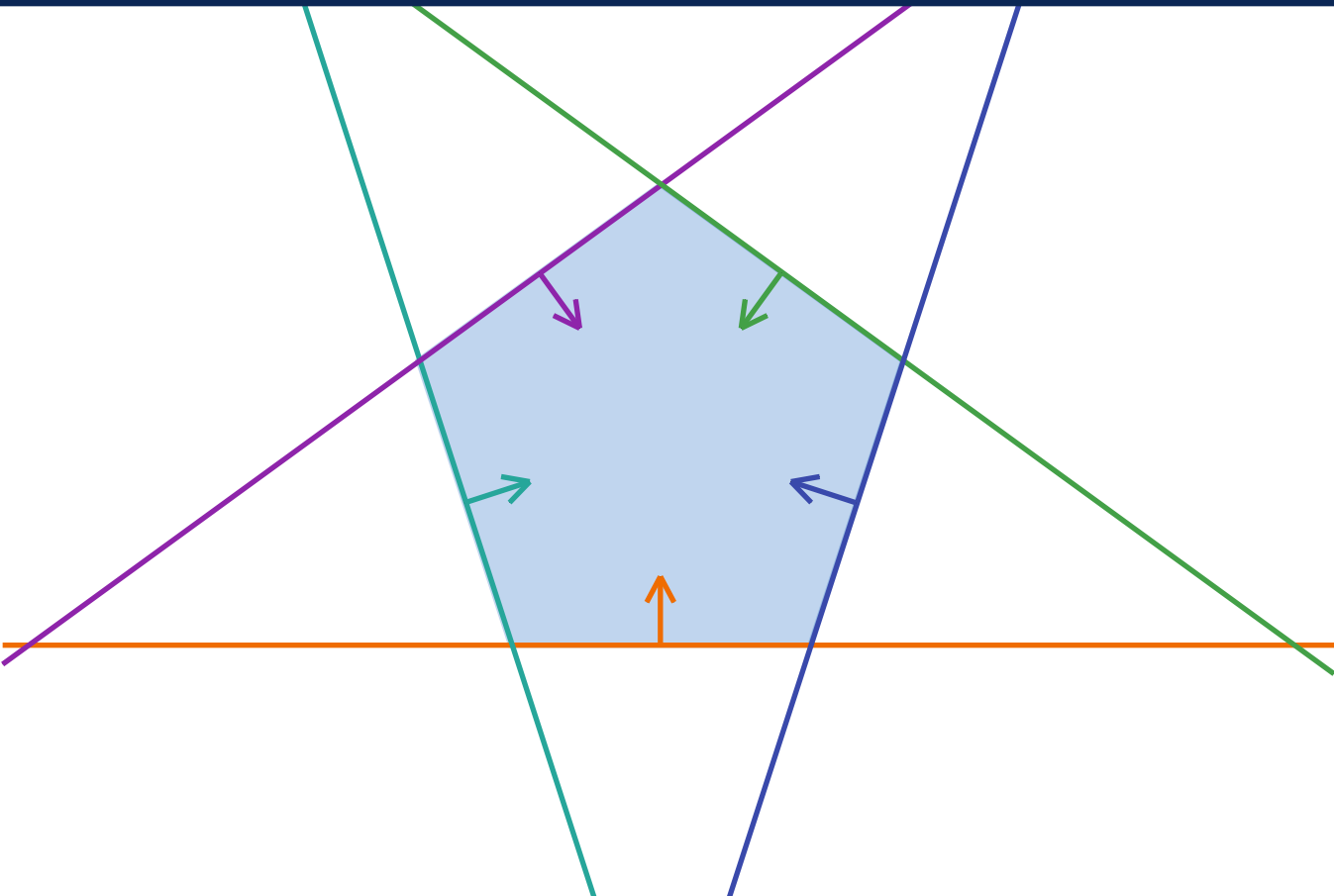
# Intersección de Semiplanos



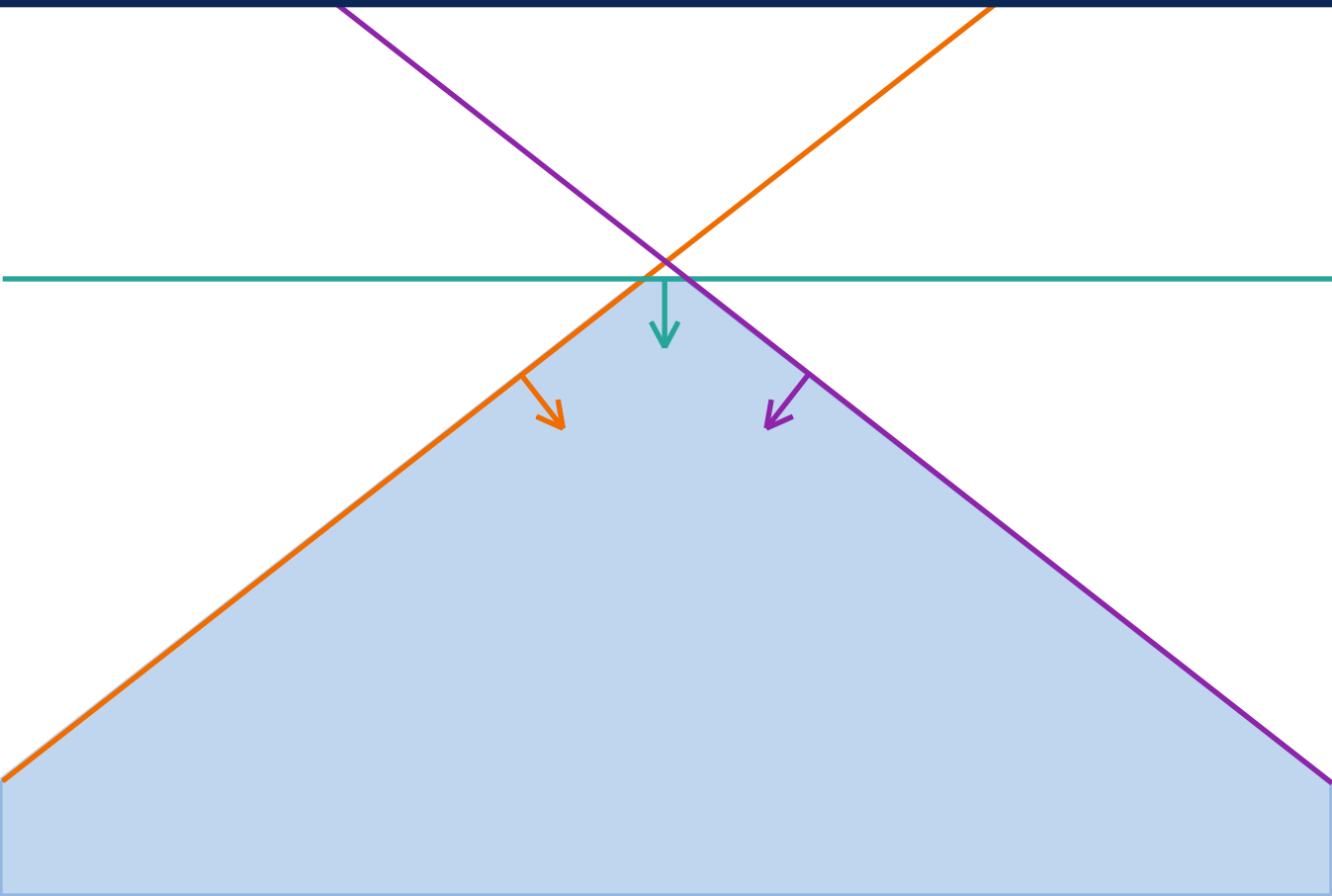
# Intersección de Semiplanos



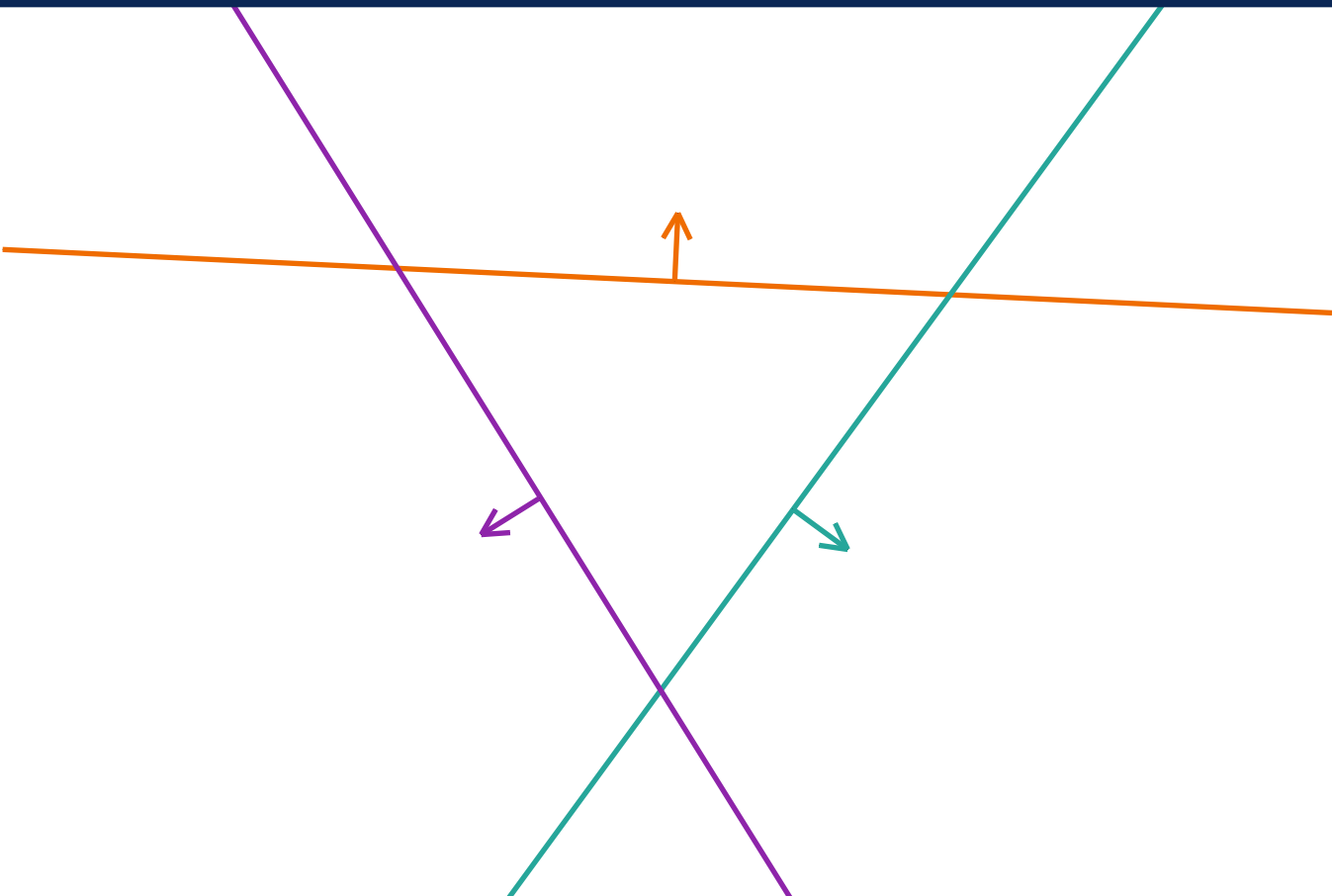
# Intersección de Semiplanos



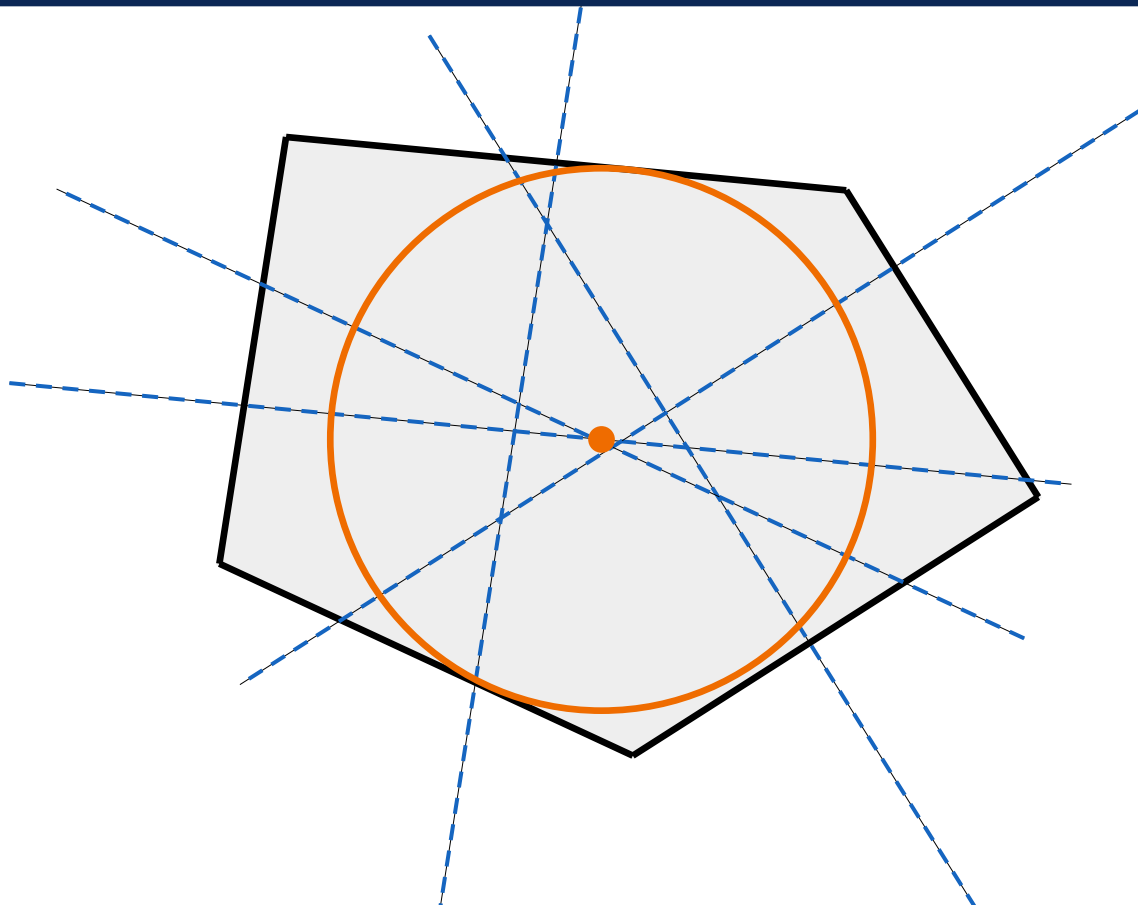
# Intersección de Semiplanos



# Intersección de Semiplanos



# Punto Mas Central



Fin!



[reedef.dev/feedback](https://reedef.dev/feedback)