Distancias

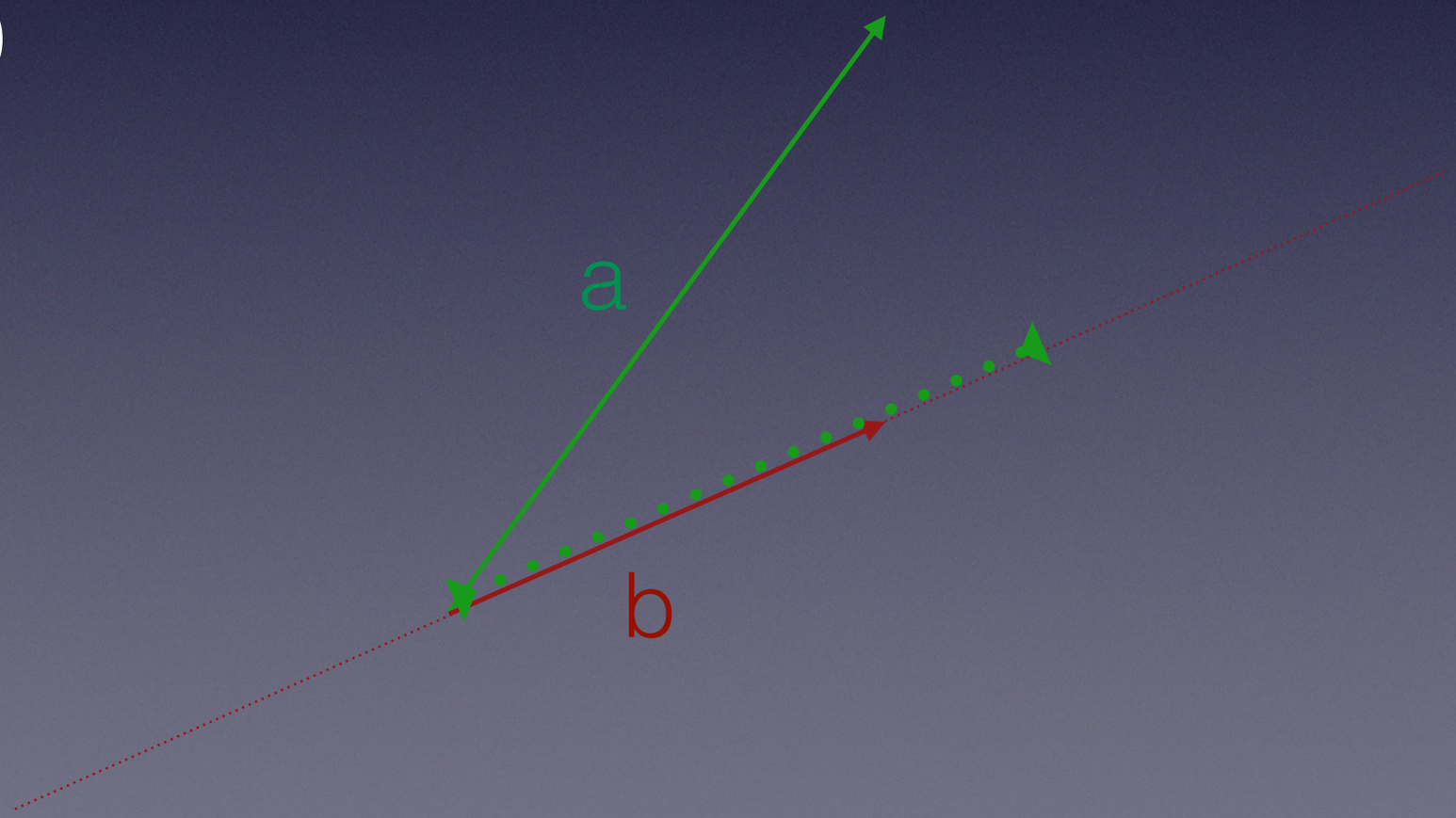
Fundamentos Matemáticos
Máster en Programación de Videojuegos
Profesor: José María Benito

Producto Escalar

$a \cdot b$

$$\frac{a \cdot b}{|b|} = |a|\cos(a,b)$$

$$\frac{a \cdot b}{|b|} = |\text{proj}(a,b)|$$



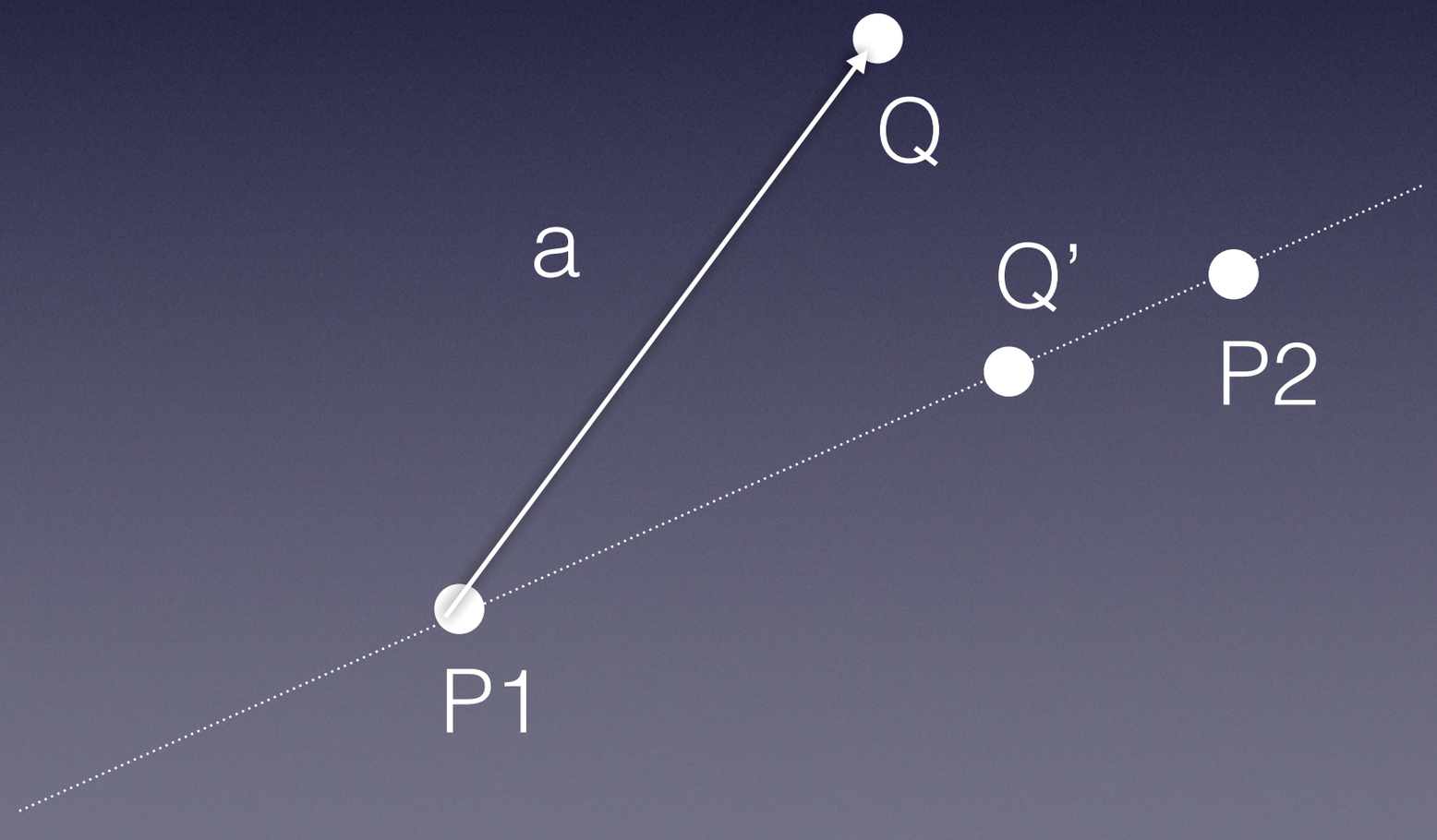
Distancia Punto Linea

a=P3-P1

b=P2-P1

$$\frac{a \cdot b}{|b|} = |proj(a,b)|$$

¿Ejercicio Q'?



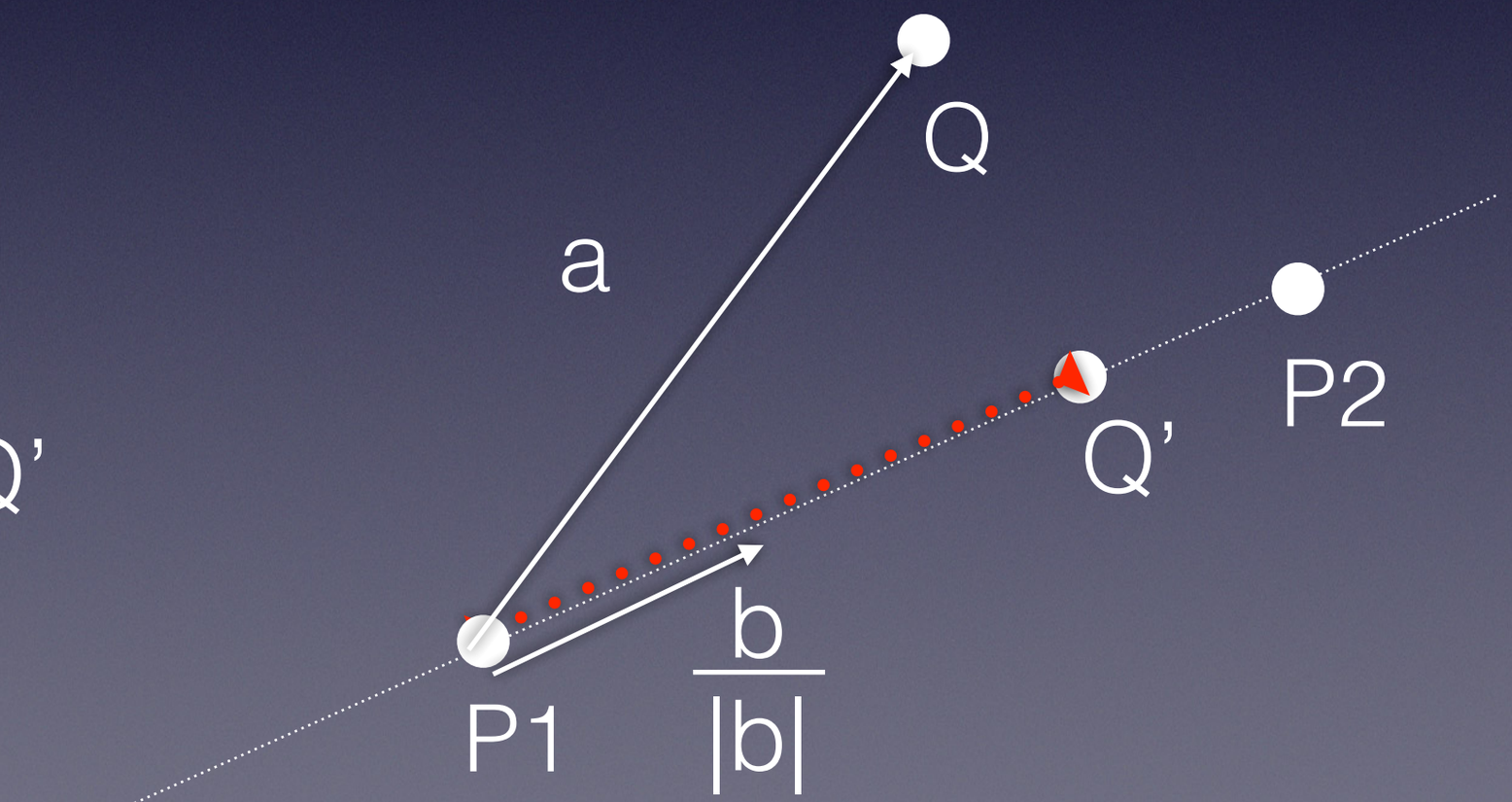
Distancia Punto Linea

a=P3-P1

b=P2-P1

$$\frac{a \cdot b}{|b|} = |proj(a,b)|$$

$$P1 + \frac{b}{|b|}\frac{a \cdot b}{|b|} = Q'$$



Distancia Punto Linea

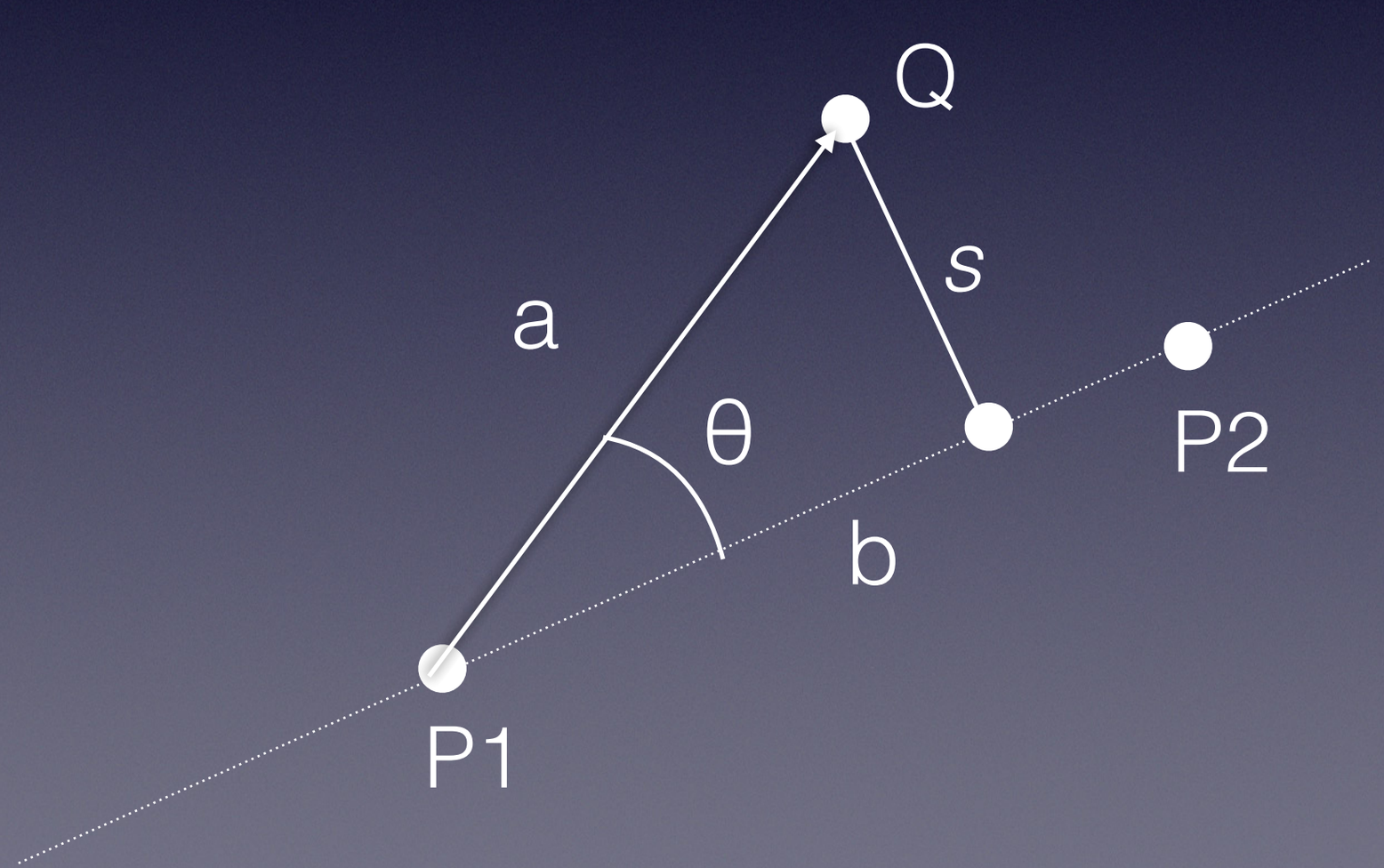
a=P3-P1

b=P2-P1

$$|a \times b| = |a||b|\sin\theta$$

$$s = |a|\sin\theta$$

$$= \frac{|a \times b|}{|b|}$$



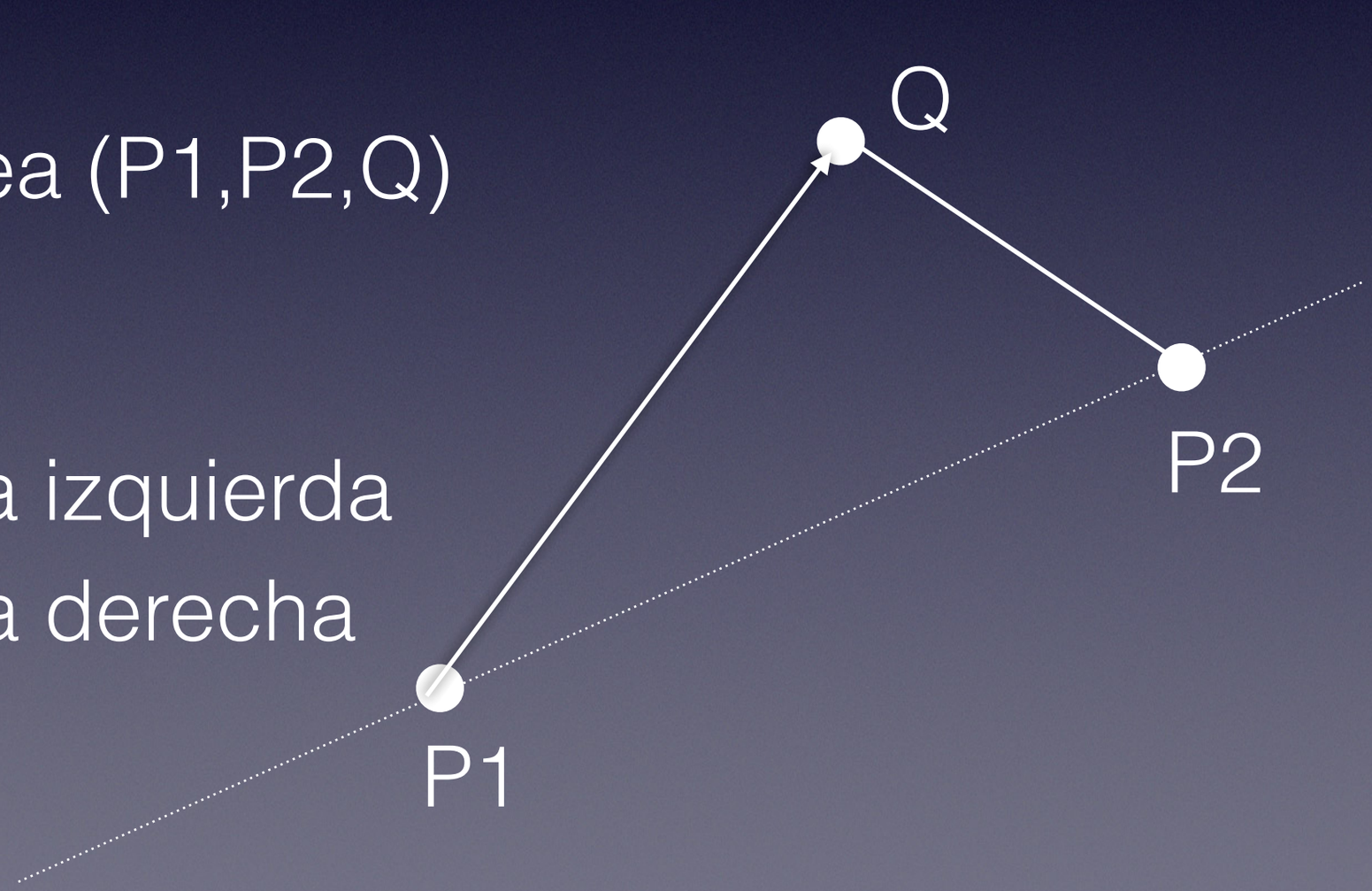
Izquierda/Derecha en 2D

Determinante (P1,P2,Q) es…

$$\begin{vmatrix} Q_x & Q_y & 1 \\ P1_x & P1_y & 1 \\ P2_x & P2_y & 1 \end{vmatrix} = 2*\text{Area}(P1,P2,Q)$$

Area > 0 = Q a la izquierda

Area < 0 = Q a la derecha

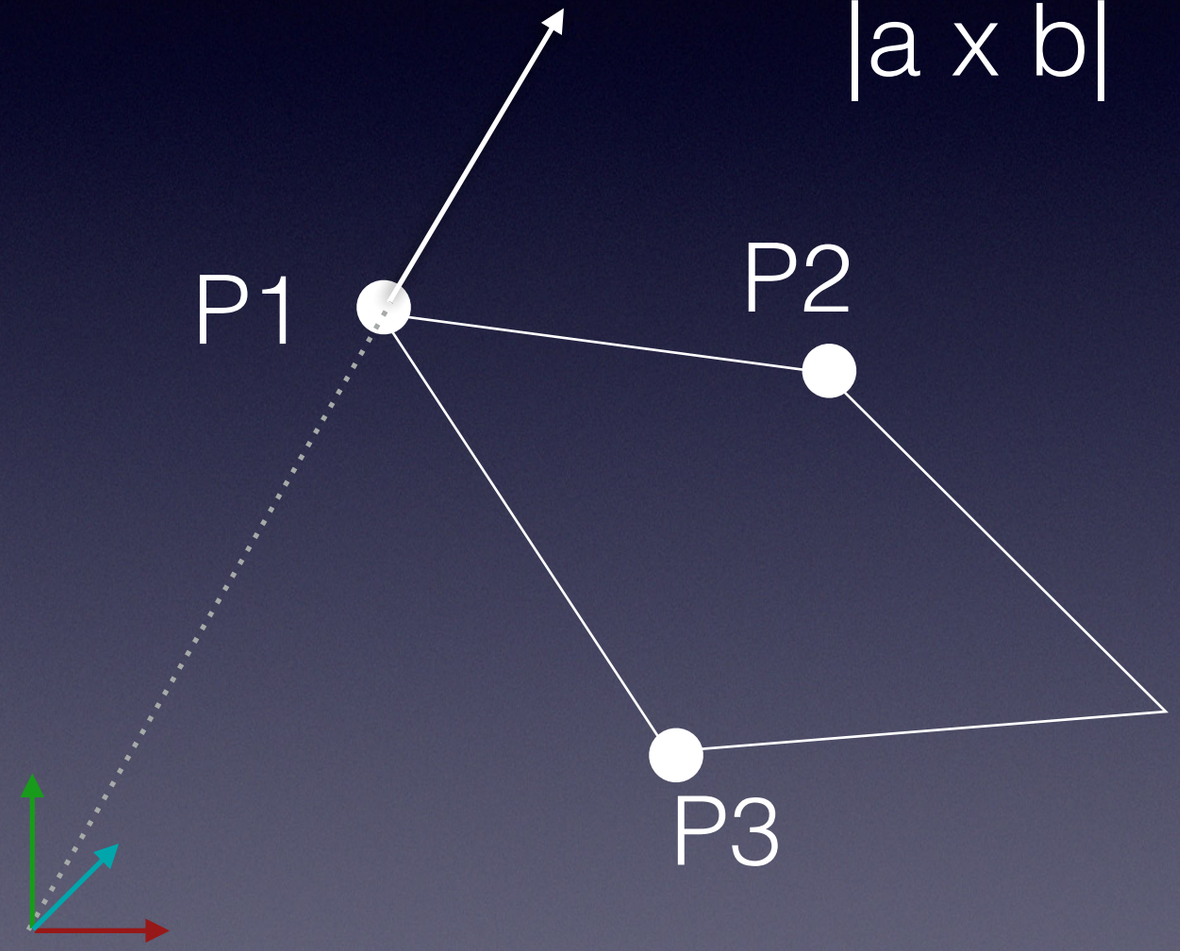


Planos

a=P3-P1

b=P2-P1

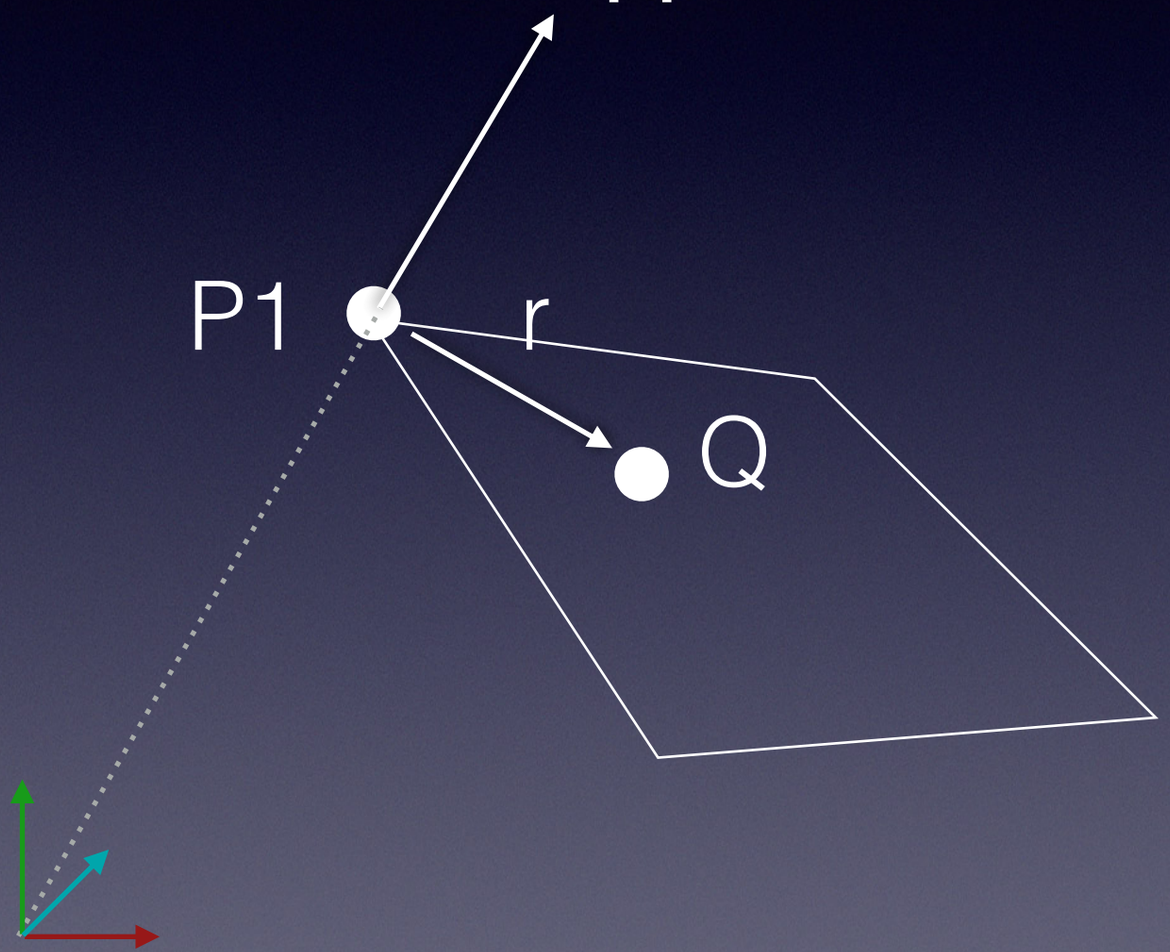
$$n = \frac{a \times b}{|a \times b|}$$



Planos

r = Q - P1

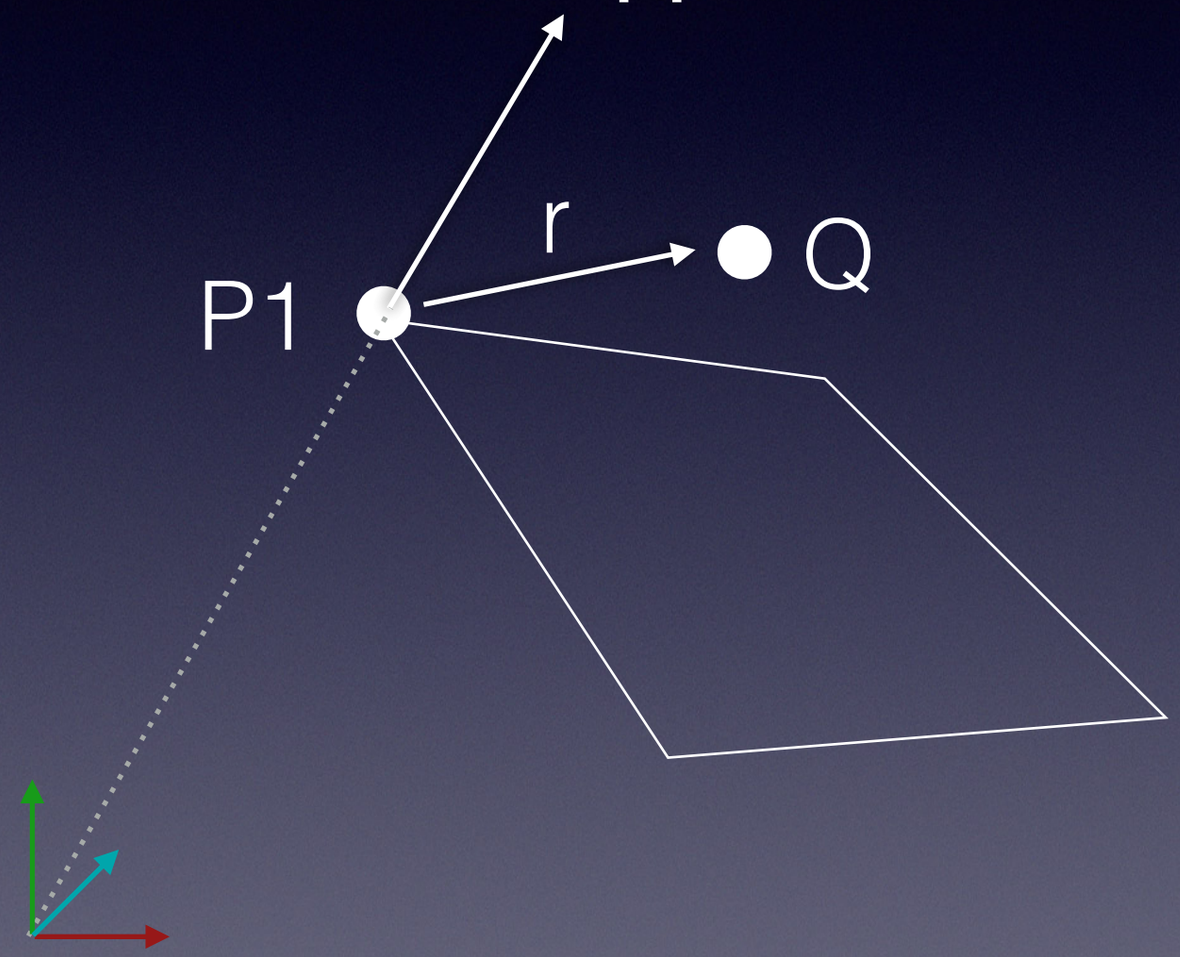
¿ r · n ?



Planos

r = Q - P1

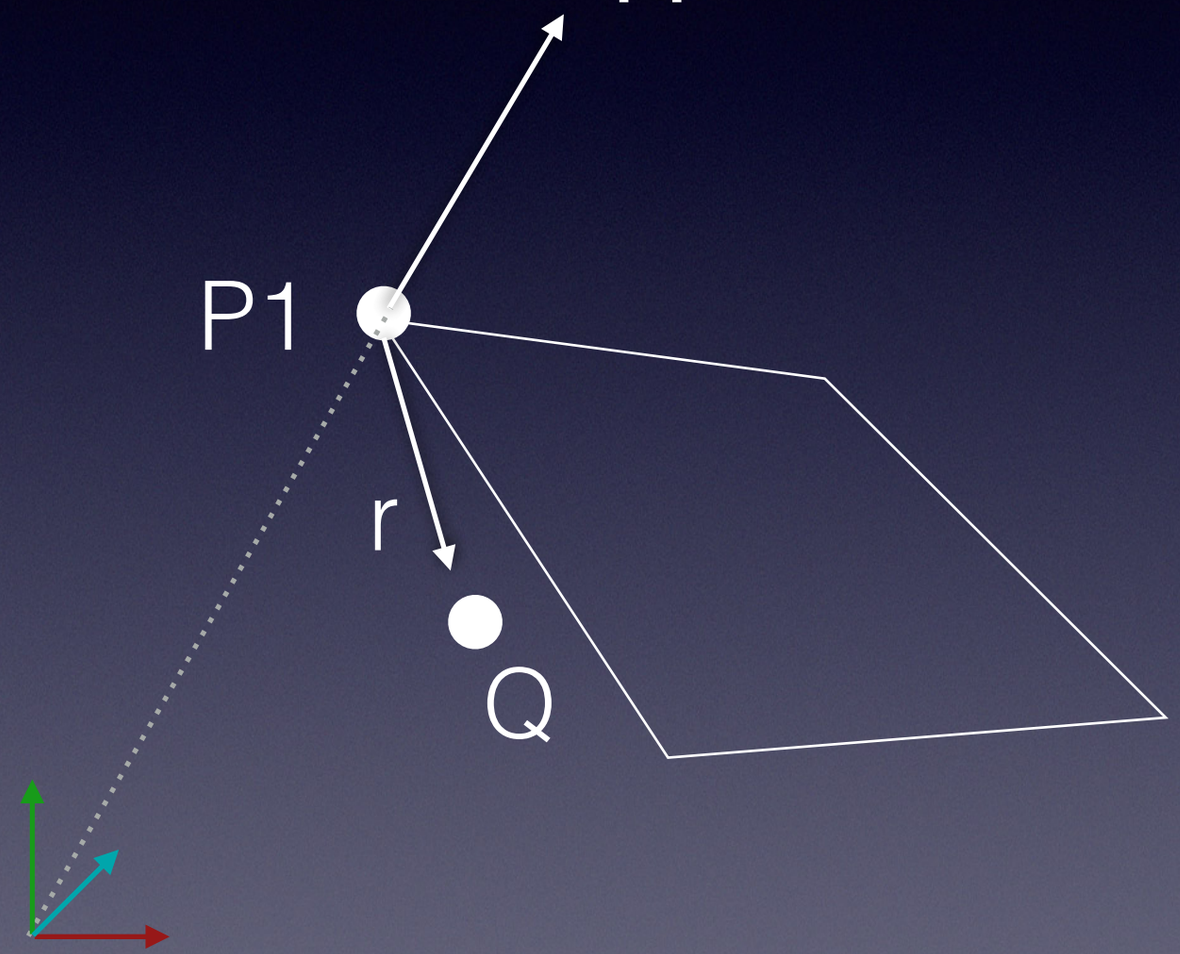
¿ r · n ?



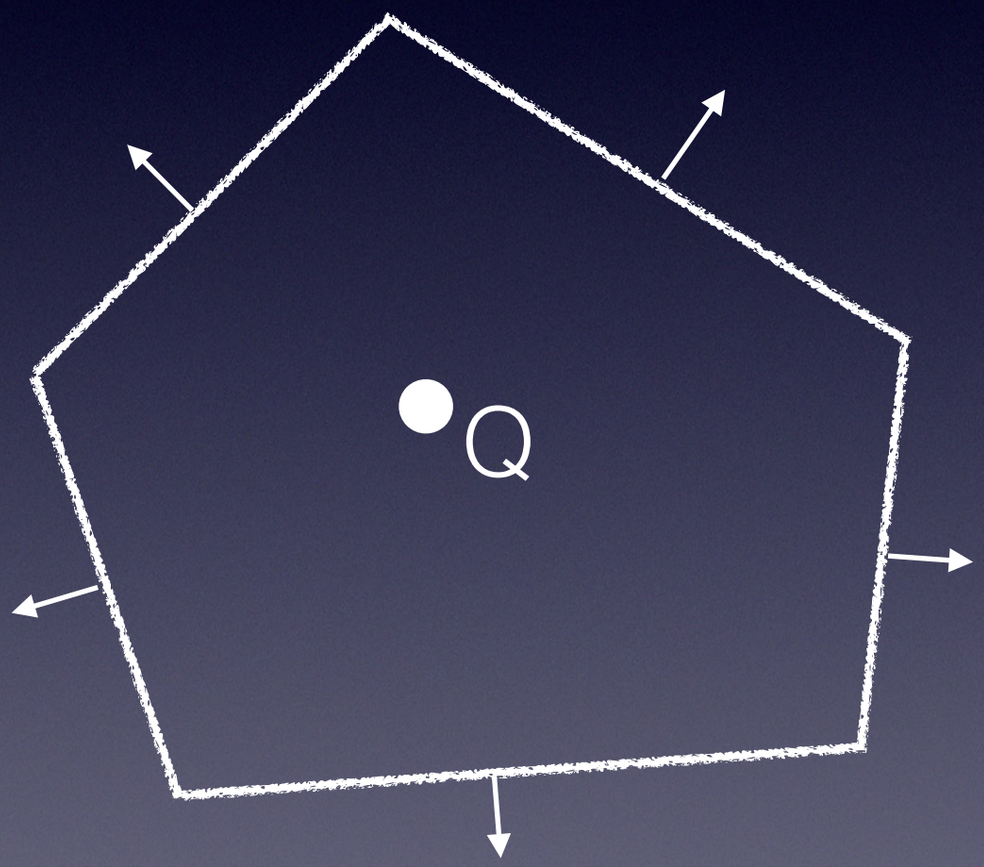
Planos

r = Q - P1

¿ r · n ?

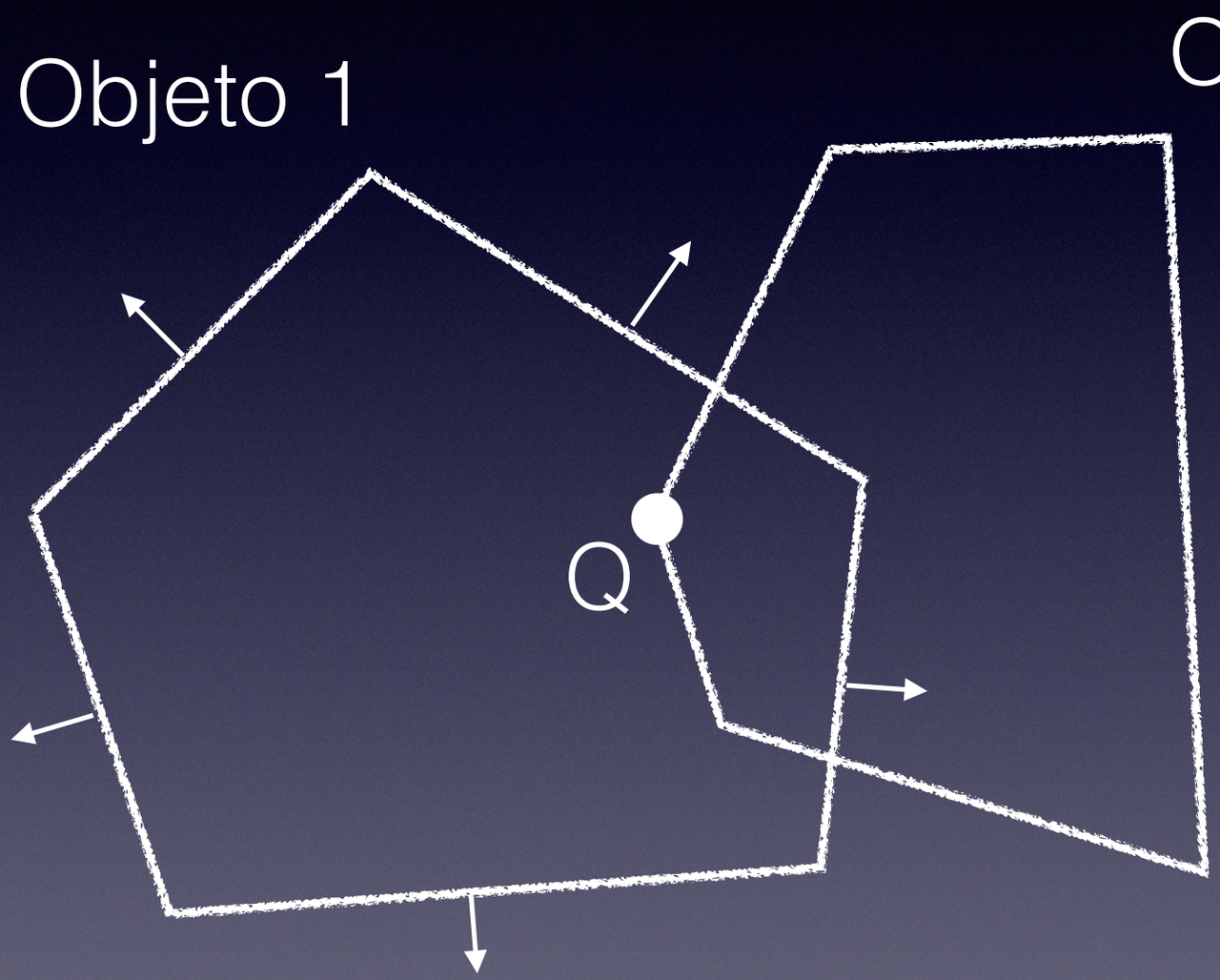


Planos



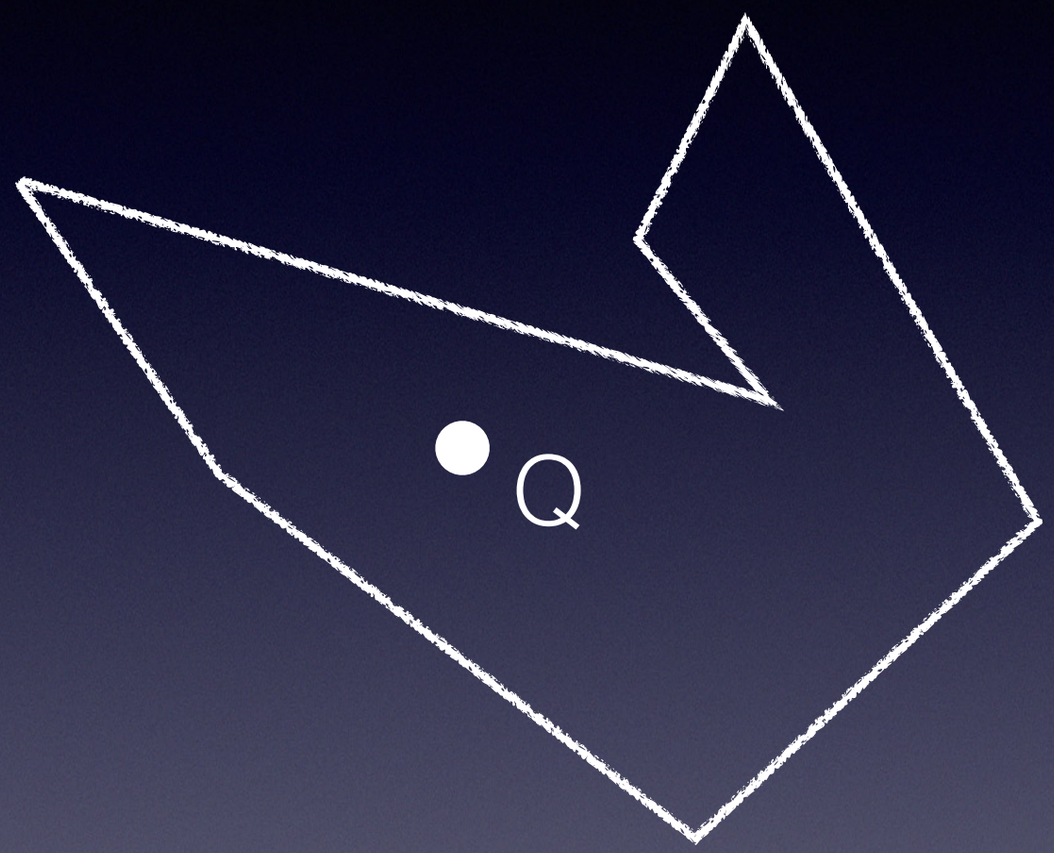
Q dentro sii:
distancia Q-plano < 0
para todos los planos

Planos



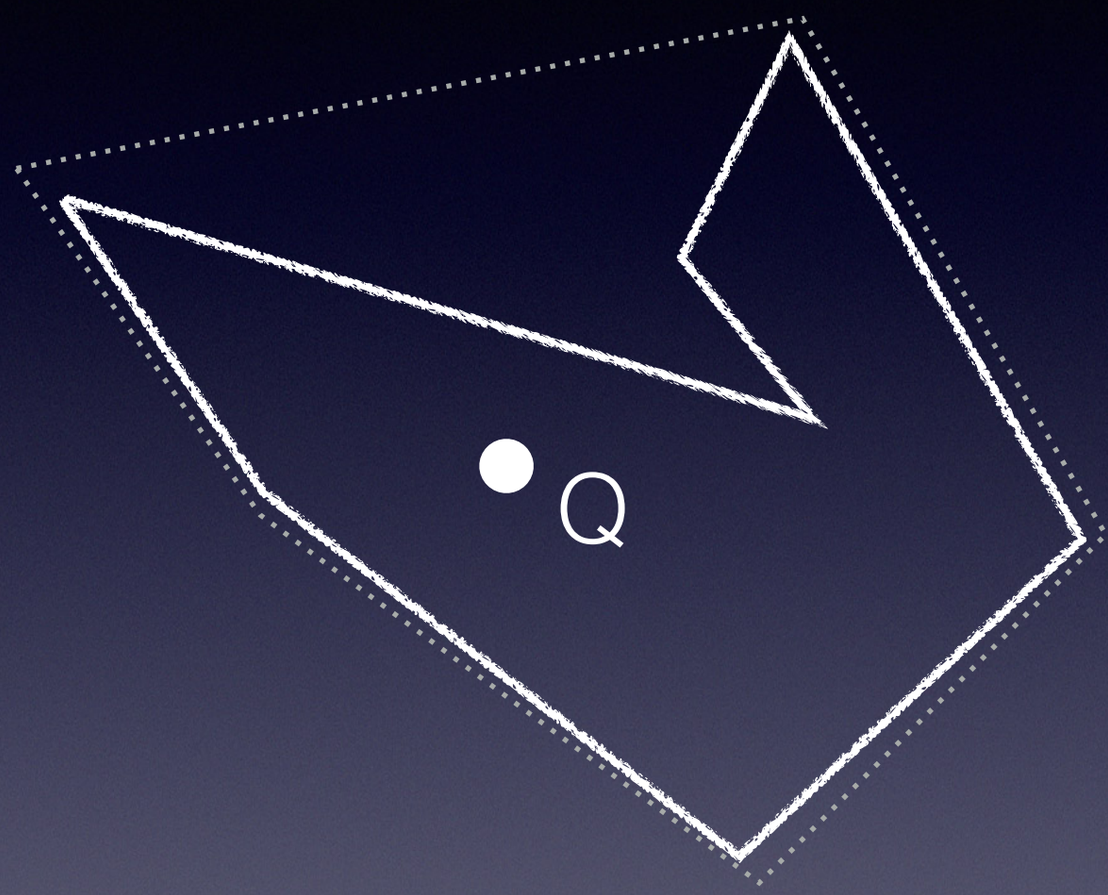
Objeto 1 colisiona
con Objeto 2
si al menos 1 Q dentro

Convex Hull



¿Distancia Q-plano < 0
para todos los planos ?

Convex Hull



¿Distancia Q-plano < 0
para todos los planos ?