

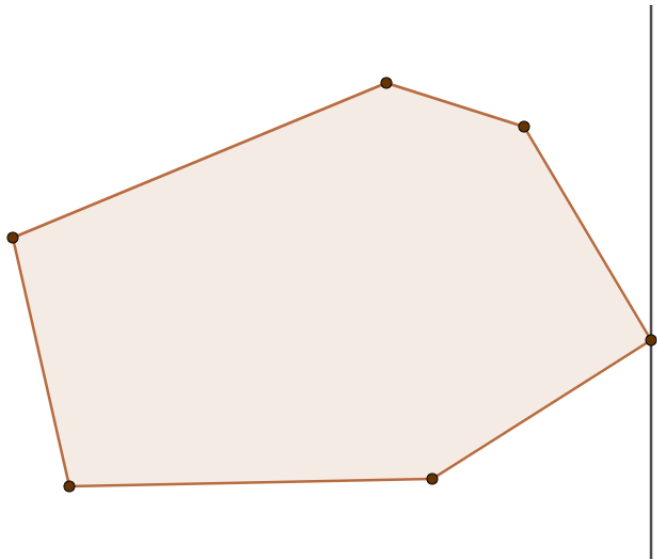
# Geometría

Carlos Miguel Soto

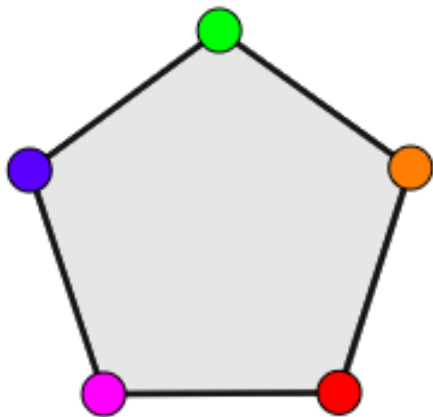
Universidad de Buenos Aires, FCEN

TC Argentina – 2023

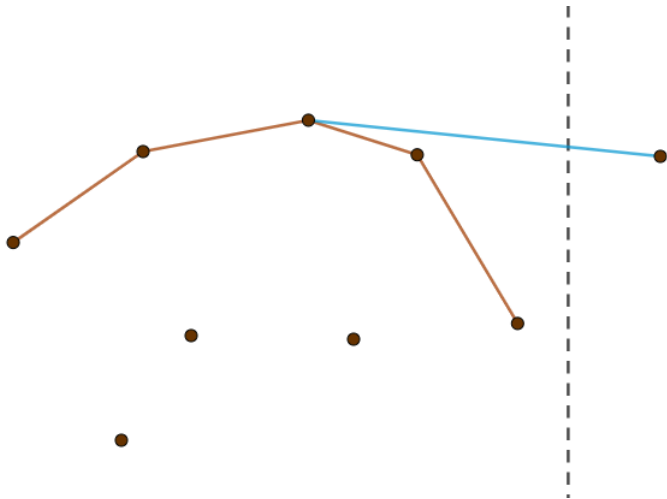
# Polígonos Convexos



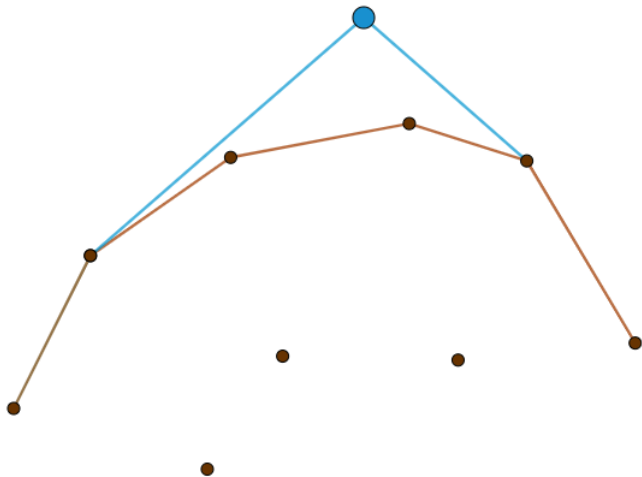
# Polígonos Convexos



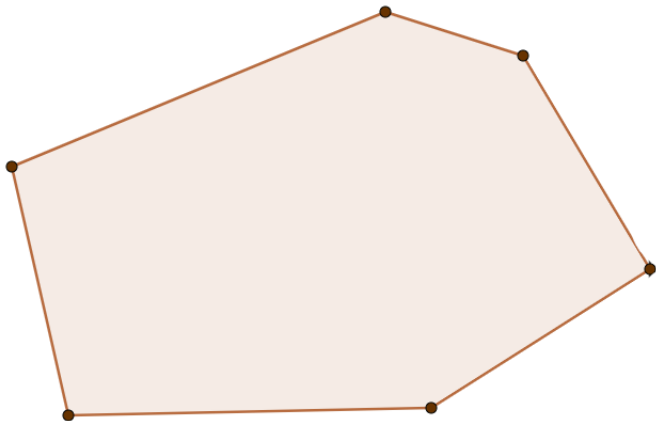
# Polígonos Convexos: Cómo Computar



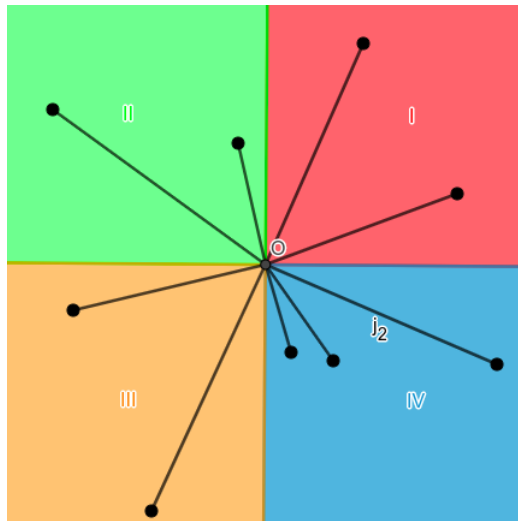
# Cómputo online



# Computar Pertenencia



# Orden Radial

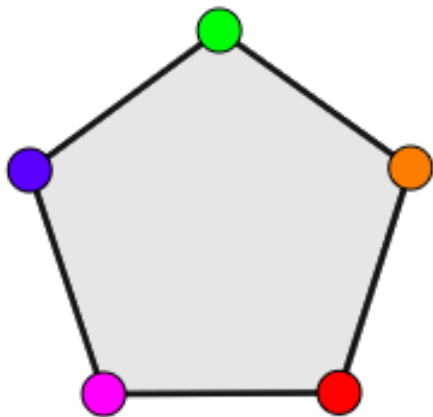


# Problema de Práctica

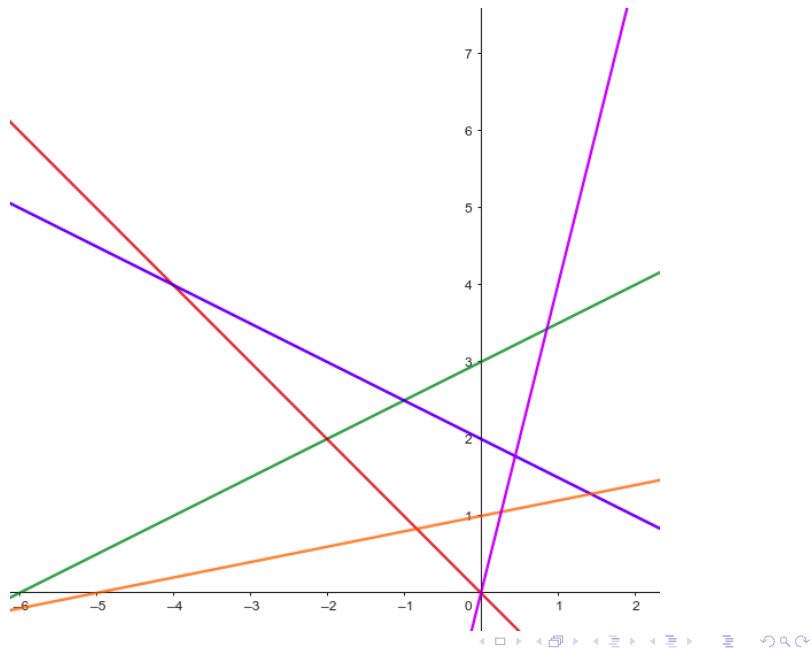
Contar la cantidad de cuadriláteros convexos dados  $n \leq 1000$  puntos.



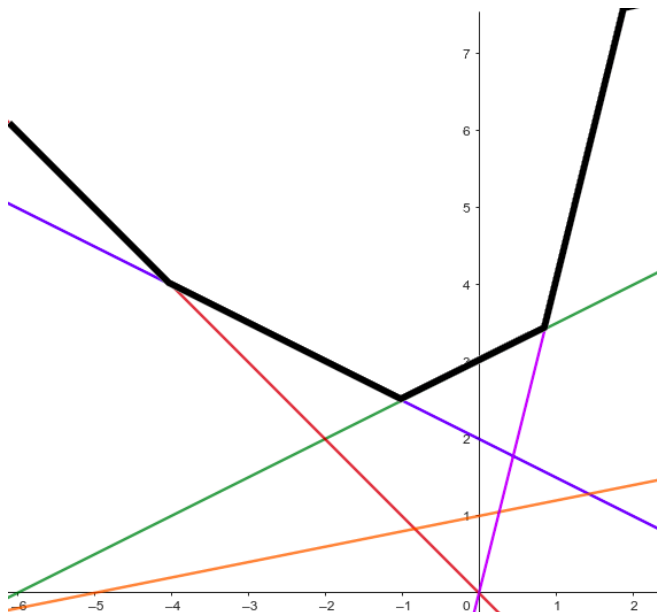
# Computar Mayor Direccional



# Chull Trick: Mayor de Varias Lineales



# Chull Trick: Mayor de Varias Lineales

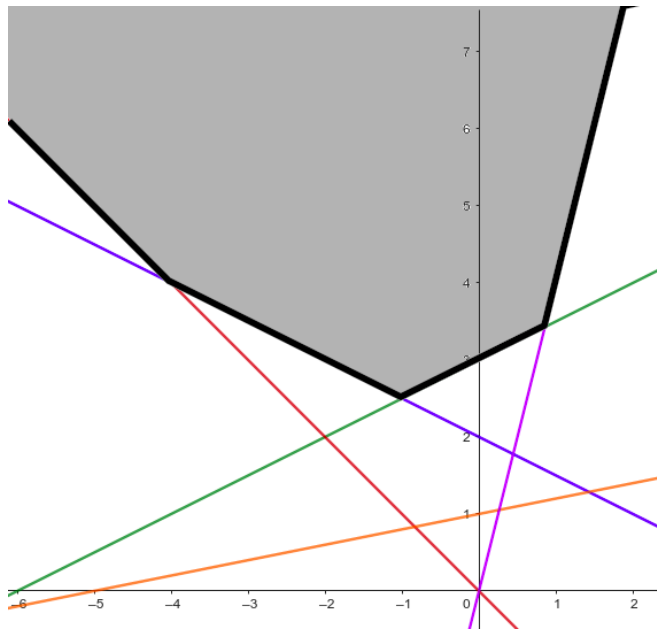


## Problemas de Ejemplo

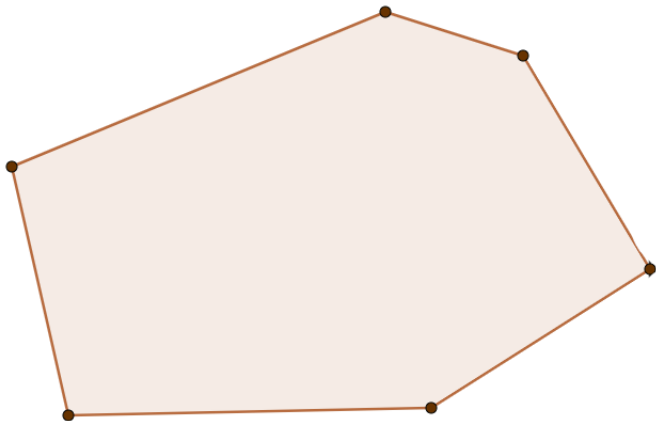
<https://vjudge.net/problem/UVA-10385>

Un duathlon consiste en correr  $k$  kilómetros y pedalear  $r$ . Hay  $n$  competidores, cada uno con una velocidad de nado y de pedaleo. Elegir  $k$  y  $r$  para que gane el primero con el mayor margen posible, fijado  $r + k = 1$ .

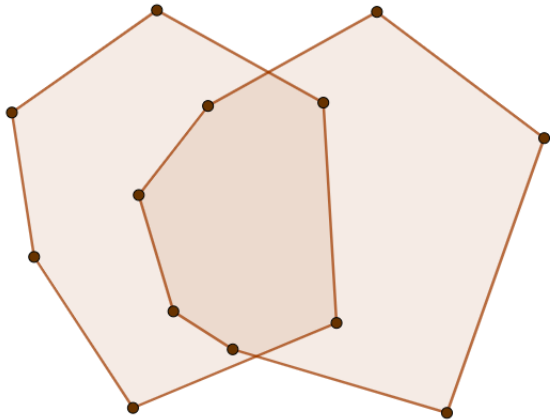
# Generalización: Halfplane Intersection



## Aplicación: Punto más interior a un polígono convexo



# Suma de Minkowsky



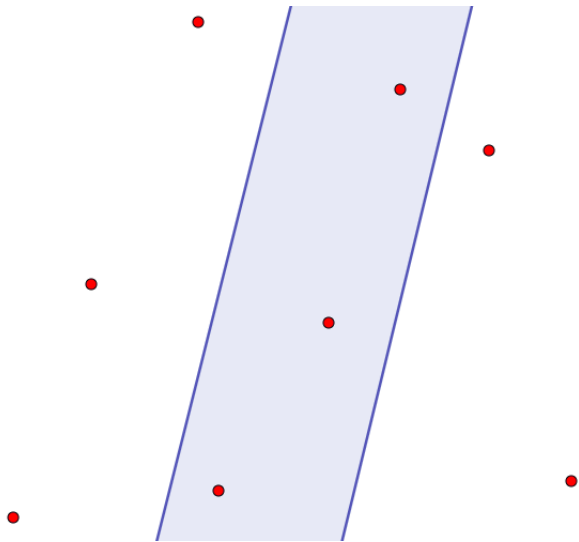
## Bonus: Bowling

Fuente: los pibes en paloko

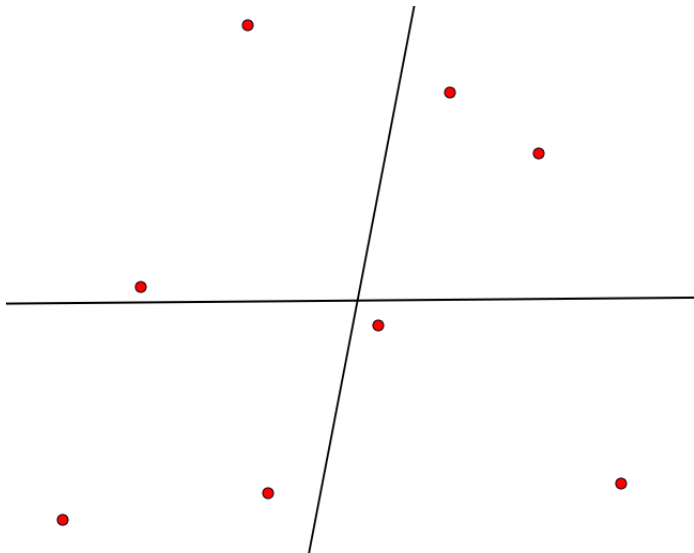
Tenés  $n$  “Pinos de Boliche” y  $q$  “Bola de Bolos”, querés saber cuántos pinos derriba cada bola.



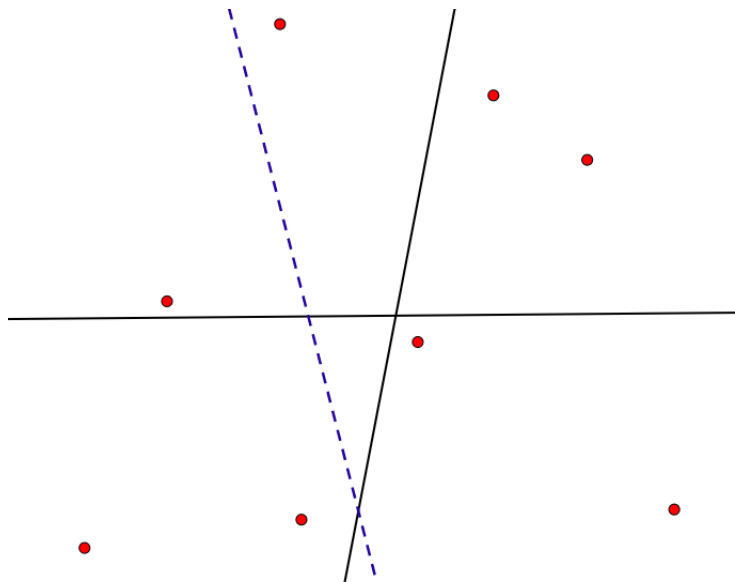
## Bonus: Bowling



## Bonus: Bowling



## Bonus: Bowling

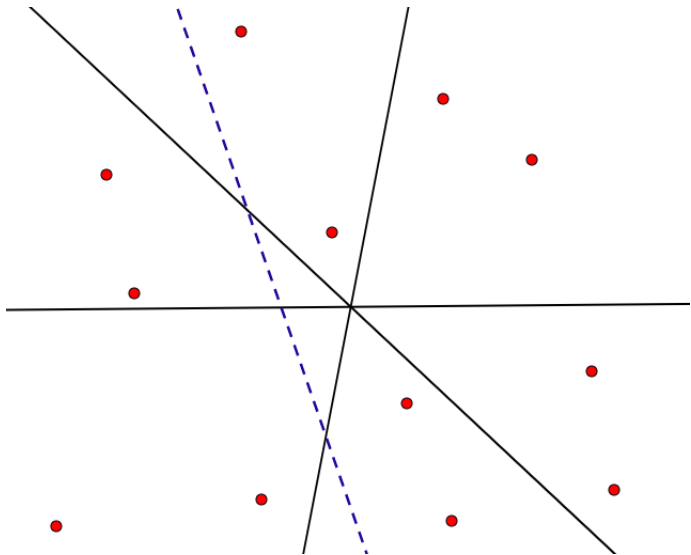


## Bonus: Bowling

$$O\left(n^{\log(3)/\log(4)}\right)$$

$$\approx O\left(n^{0.79}\right)$$

## Bonus: Bowling



## Bonus: Bowling

$$O\left(n^{\log(4)/\log(6)}\right)$$

$$\approx O\left(n^{0.77}\right)$$