

# Control

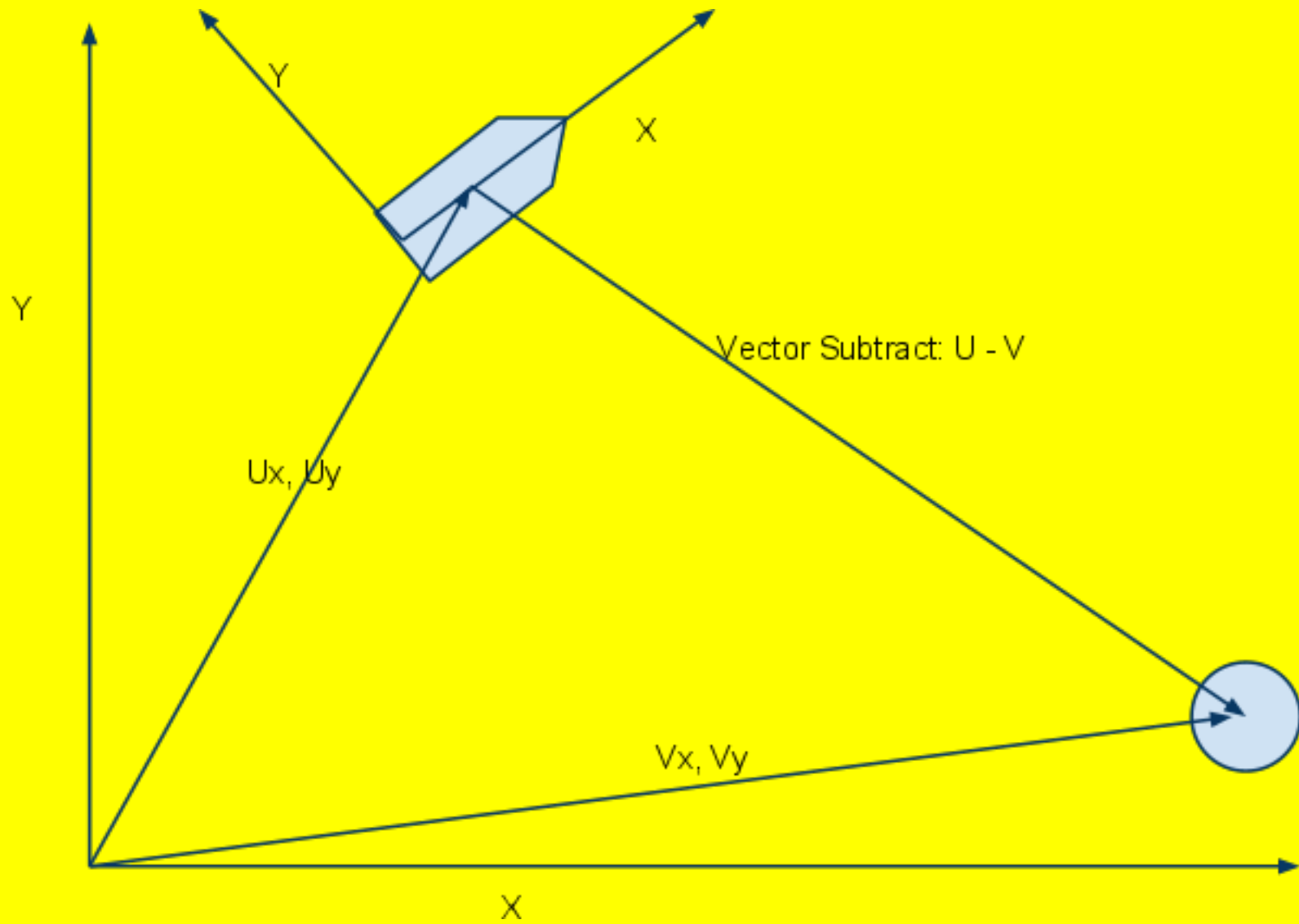
AKA

Artificial Intelligence in Games

# Interception

- How do I intercept another entity
- Predator versus Prey
  
- Assumptions:
  - Predator Controls:
    - Turn left or turn right
  - Predator Algorithm:
    - If prey is to your right turn right
    - If prey is to your left turn left
    - else move straight

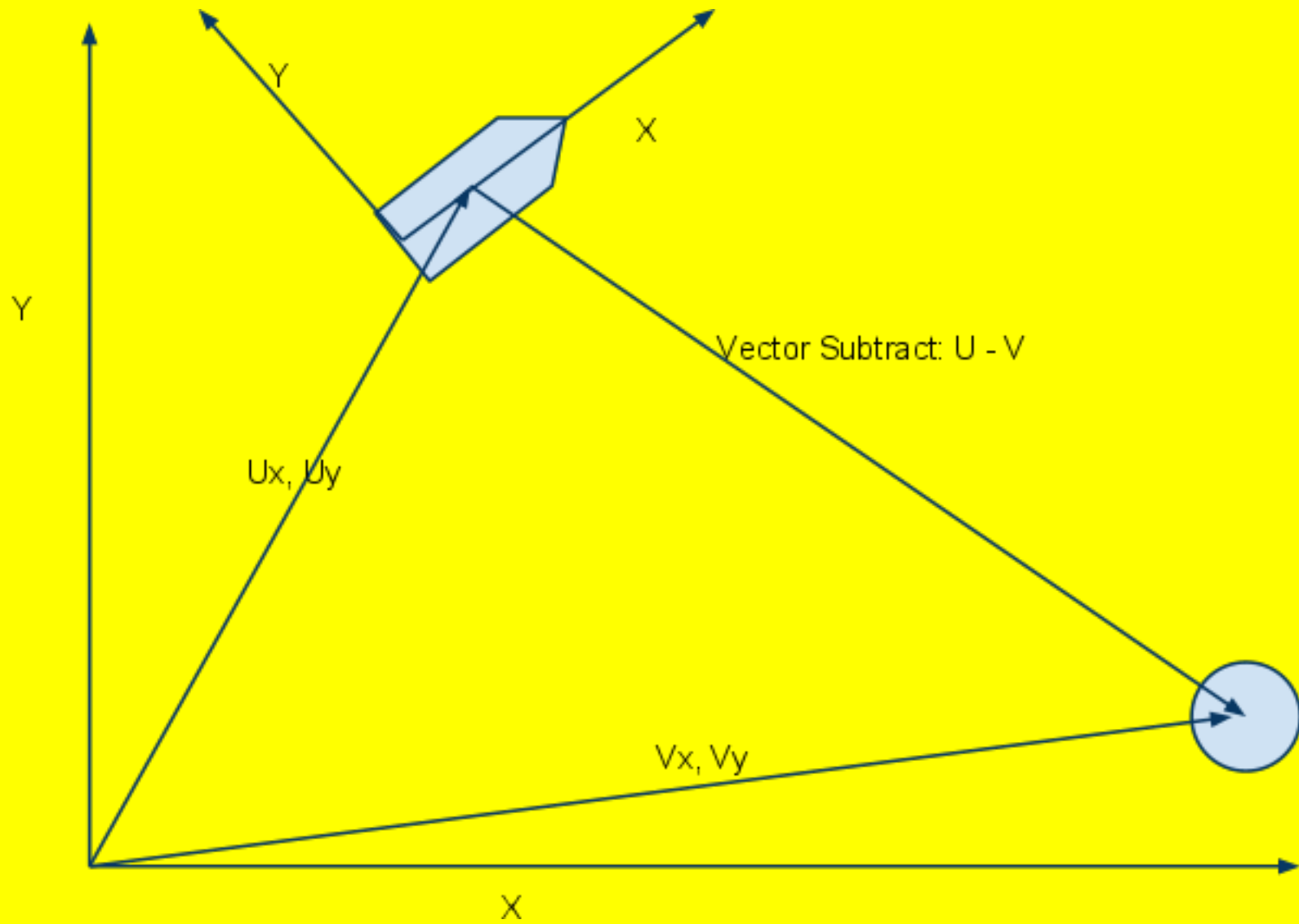
# Coordinates



# The Geometry

- Diff =  $U - V$ 
  - Is the vector from Predator to Prey
- Now we want to know whether this vector points to Predator's left or right
- To do this:
  - Transform this vector to Predator's coordinate space
  - Then, determine what direction the predator is moving in - in predator's coordinate space? That is, which axis is "forward" for the predator?
  - If the transformed vector points to the left of forward
    - turn left
  - If the transformed vector points to the right of forward
    - turn right

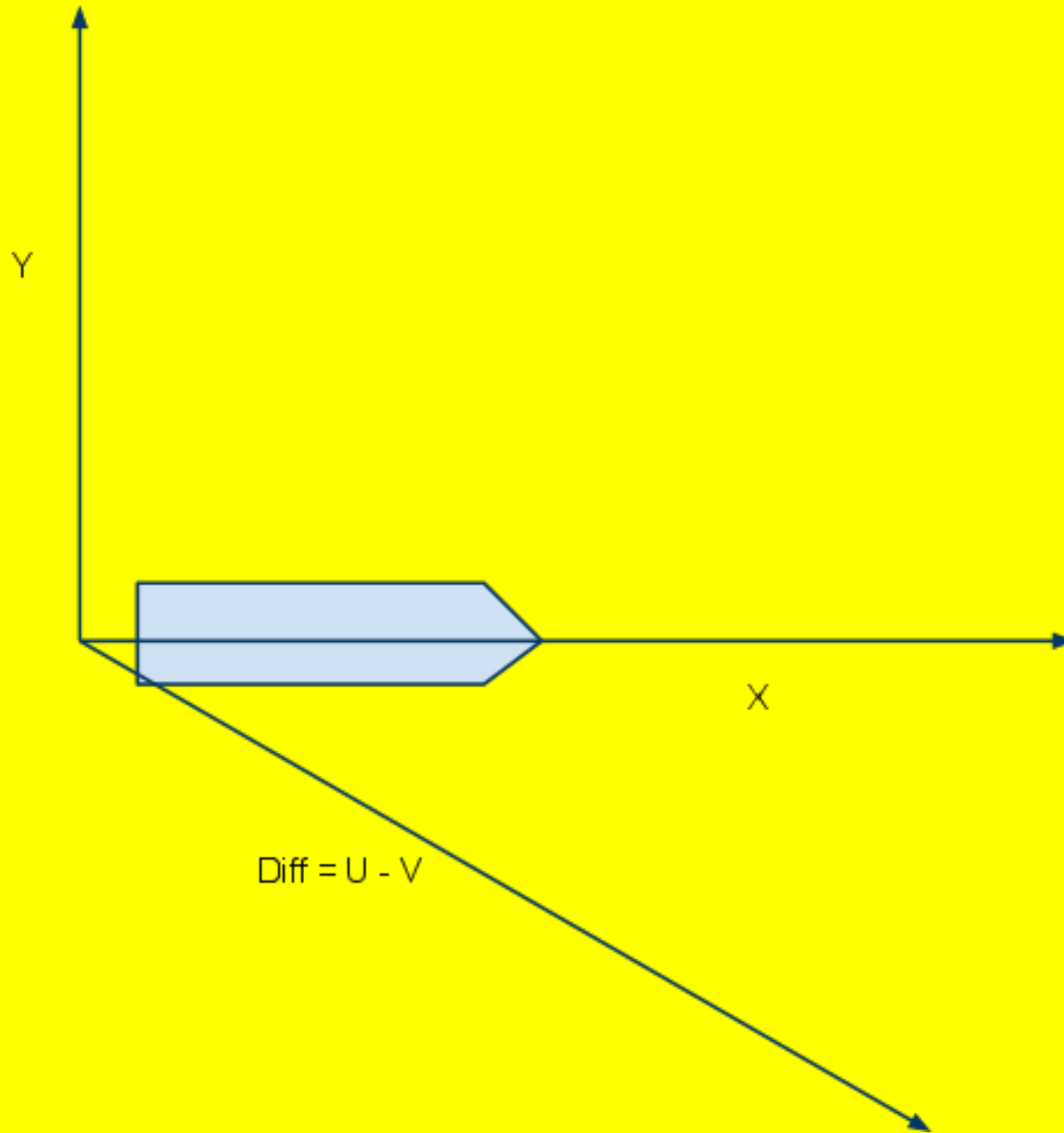
# Coordinates



# The Math

- RotateVector2D(theta, (x, y))
- $x' = x \cos(\theta) + y \sin(\theta)$
- $y' = -x \sin(\theta) + y \cos(\theta)$
  
- How do you check if  $(x', y')$  is to the left or right of predator at  $(0, 0)$ ?

# Coordinates



# Intercept code

- Intercept:
- If  $(x', y')$  is to the left of me
  - if  $y' > 0$
- If  $(x', y')$  is to the right of me
  - if  $y' < 0$

- if  $y' > 0$ :
  - turn left
- if  $y' < 0$ 
  - turn right



- Floating point issues:
- Epsilon = 0.001

- if  $y' > \text{Epsilon}$ :
  - turn left
- if  $y' < -\text{Epsilon}$ :
  - turn right



# Flee is the inverse of Intercept

- **Flee:**
  - If  $(x', y')$  is to the left of me
    - turn right
  - If  $(x', y')$  is to the right of me
    - turn left
- 
- Invert the less than and greater than signs in your intercept logic