

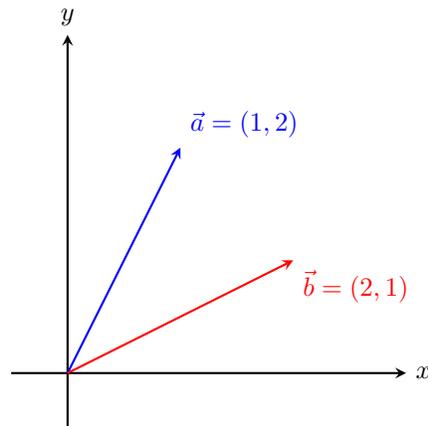
## Orthogonality of Vectors: Visual and Analytical Check

**Case 1: Vectors  $\vec{a} = (1, 2)$  and  $\vec{b} = (2, 1)$**

**Dot Product Calculation:**

$$\vec{a} \cdot \vec{b} = (1)(2) + (2)(1) = 2 + 2 = 4$$

**Conclusion:** Since the dot product is  $\neq 0$ , the vectors are **not orthogonal**.



**Case 2: Vectors  $\vec{a} = (1, 2)$  and  $\vec{c} = (-2, 1)$**

**Dot Product Calculation:**

$$\vec{a} \cdot \vec{c} = (1)(-2) + (2)(1) = -2 + 2 = 0$$

**Conclusion:** Since the dot product is 0, the vectors are **orthogonal** (perpendicular).

