

orthogonality

Two vectors are orthogonal to one another if the dot product of those two vectors is equal to zero

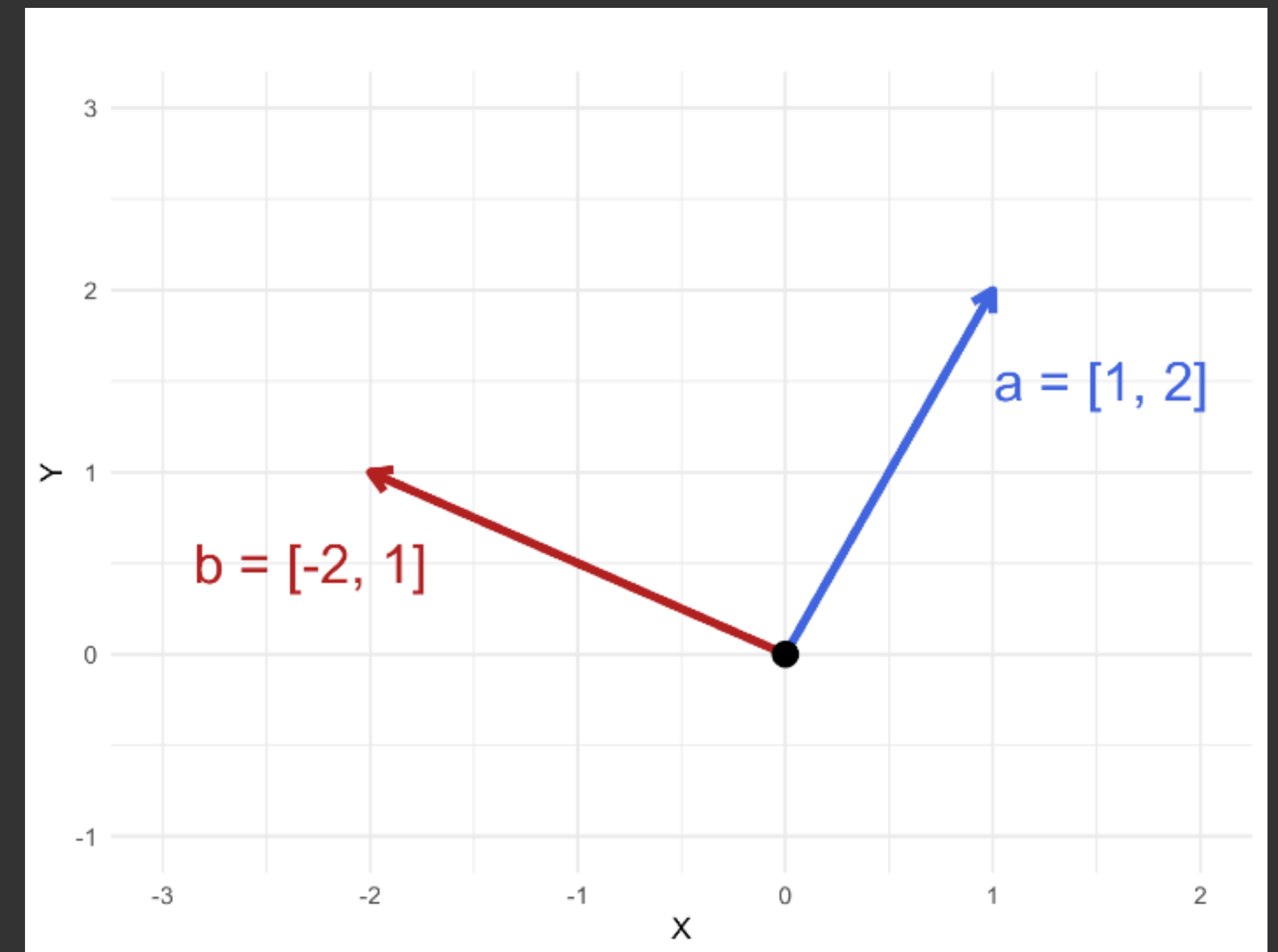
example

Let $\vec{a} = (1,2)$ and $\vec{b} = (-2,1)$

The dot product is

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

Since their dot product is zero, \vec{a} and \vec{b} are orthogonal.



the matrix

- A matrix is a table of numbers rather than a list as is the case for vectors
- The **size of a matrix**: number of rows \times number of columns = $m \times n$ (read "m by n")
- You can think of vectors as matrices that happen to only have one column or one row

$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{bmatrix}$$

- A **square matrix** is a matrix that has an equal number of columns and rows, i.e., $m = n$
- A **zero matrix** is a square matrix in which all elements are 0