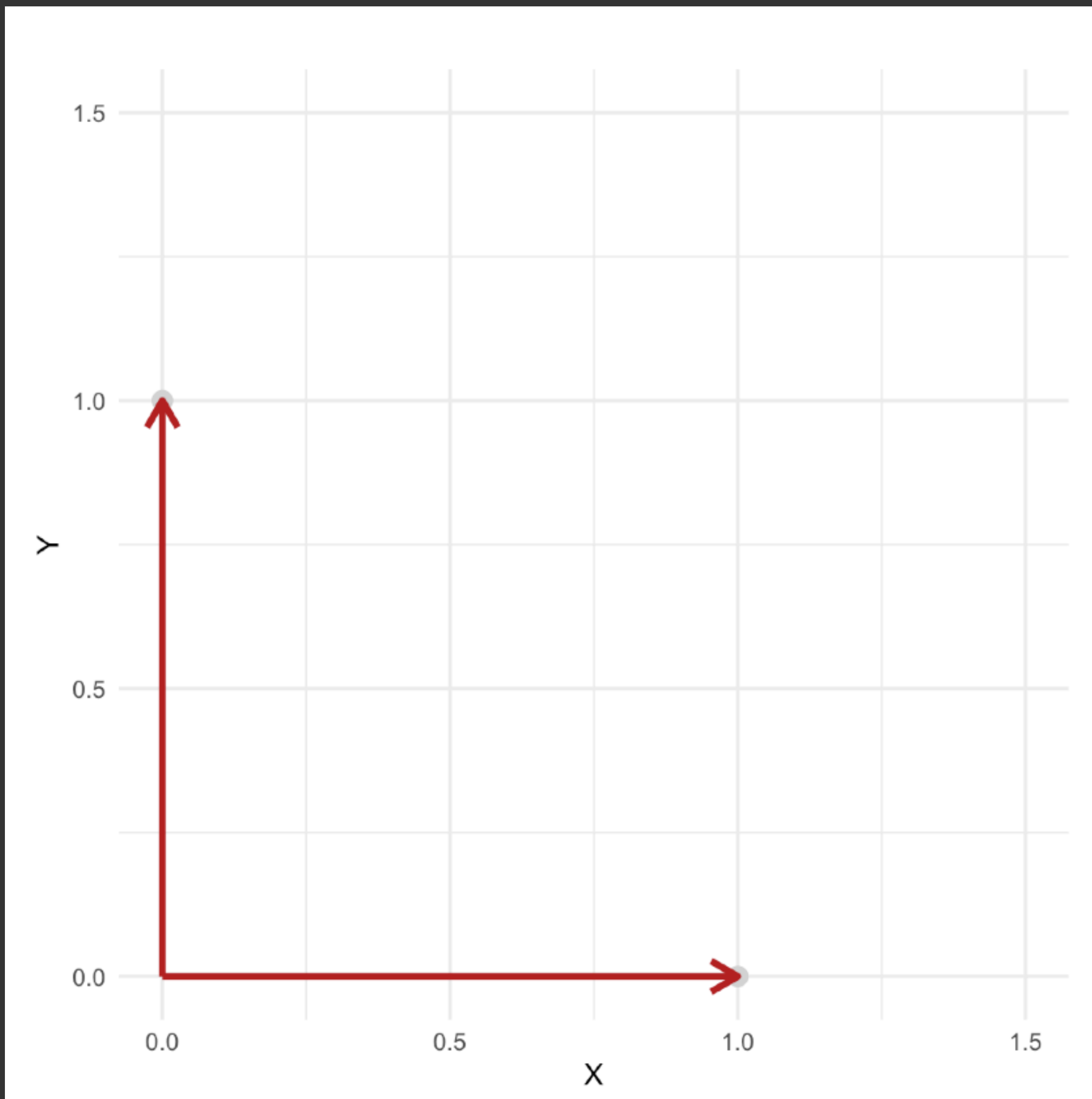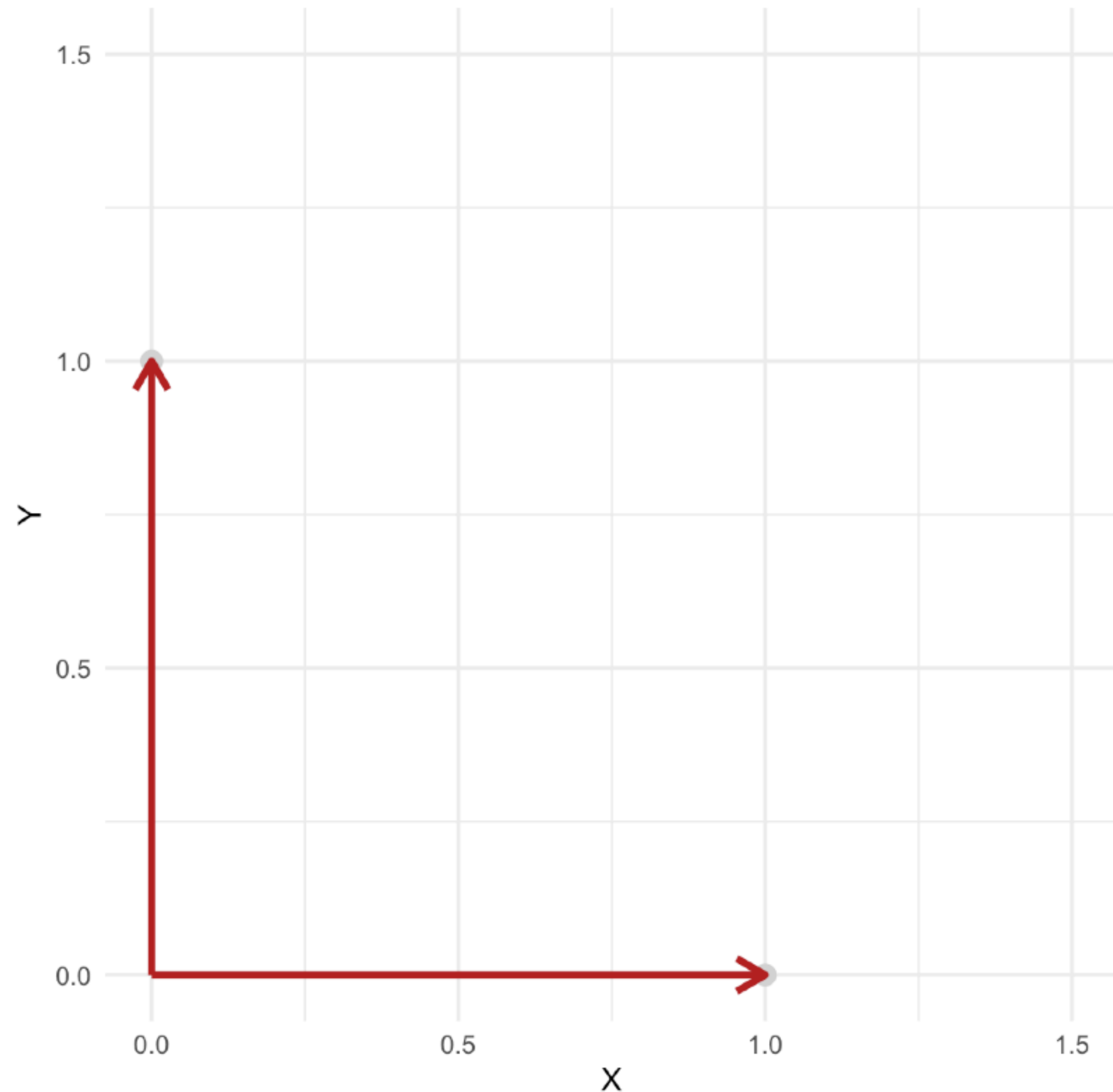# example

- Consider space $\mathbb{R}^2$

- Consider vectors $\vec{x} = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$ and $\vec{y} = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$

- Any vector $\begin{bmatrix} a \\ b \end{bmatrix} \in \mathbb{R}^2$ can be expressed as a linear combination of these two vectors:
$$\begin{bmatrix} a \\ b \end{bmatrix} = a \begin{bmatrix} 1 \\ 0 \end{bmatrix} + b \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

- We also note that $\vec{x}$ and $\vec{y}$ are linearly independent since the only solution to
$$c_1 \vec{x} + c_2 \vec{y} = 0 \text{ is } c_1 = c_2 = 0$$

example

- $\vec{x}$ and $\vec{y}$ are unit vectors in the direction of the coordinate axes

- We are used to representing all vectors in $\mathbb{R}^2$ as linear combinations of these vectors