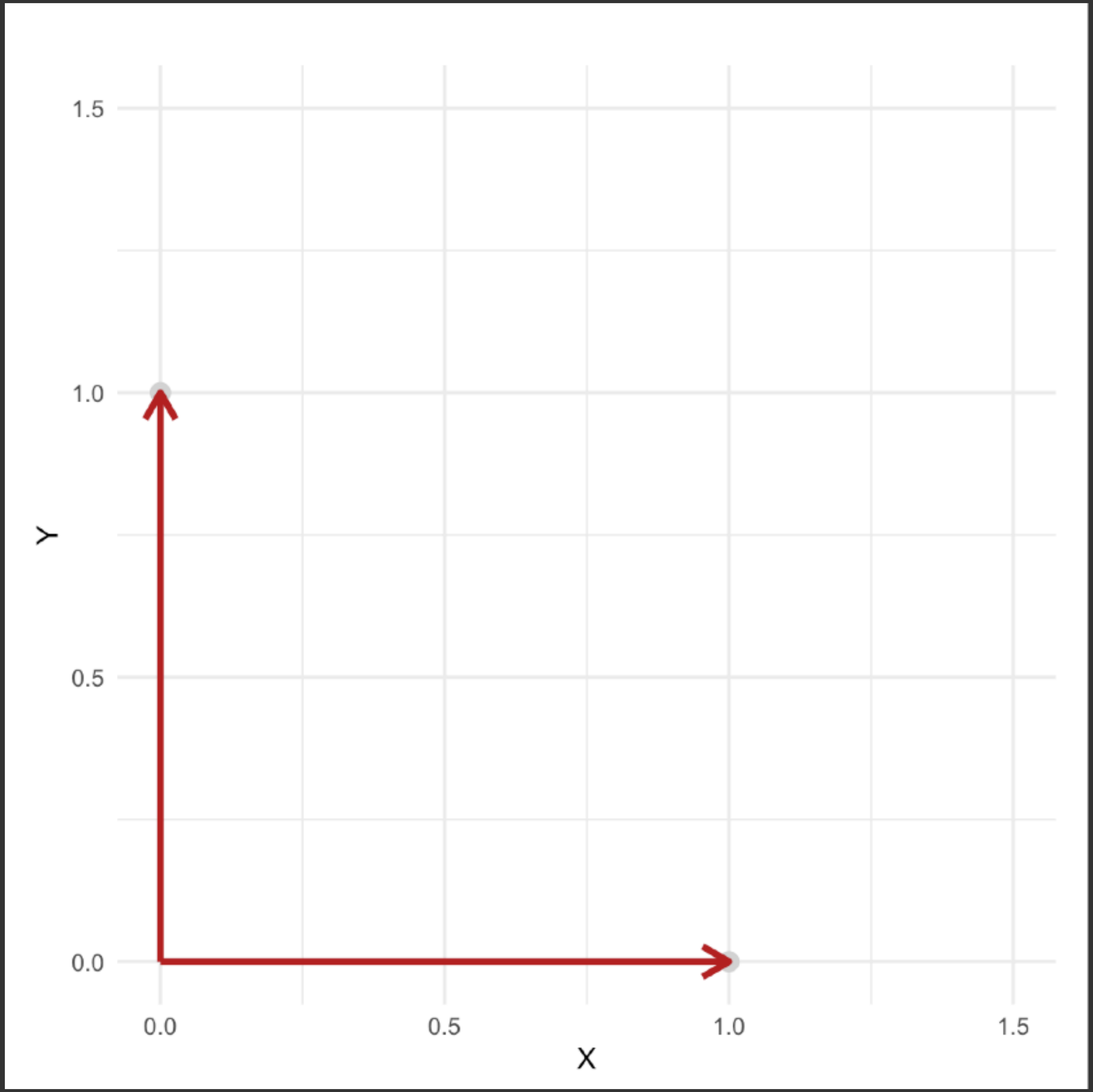
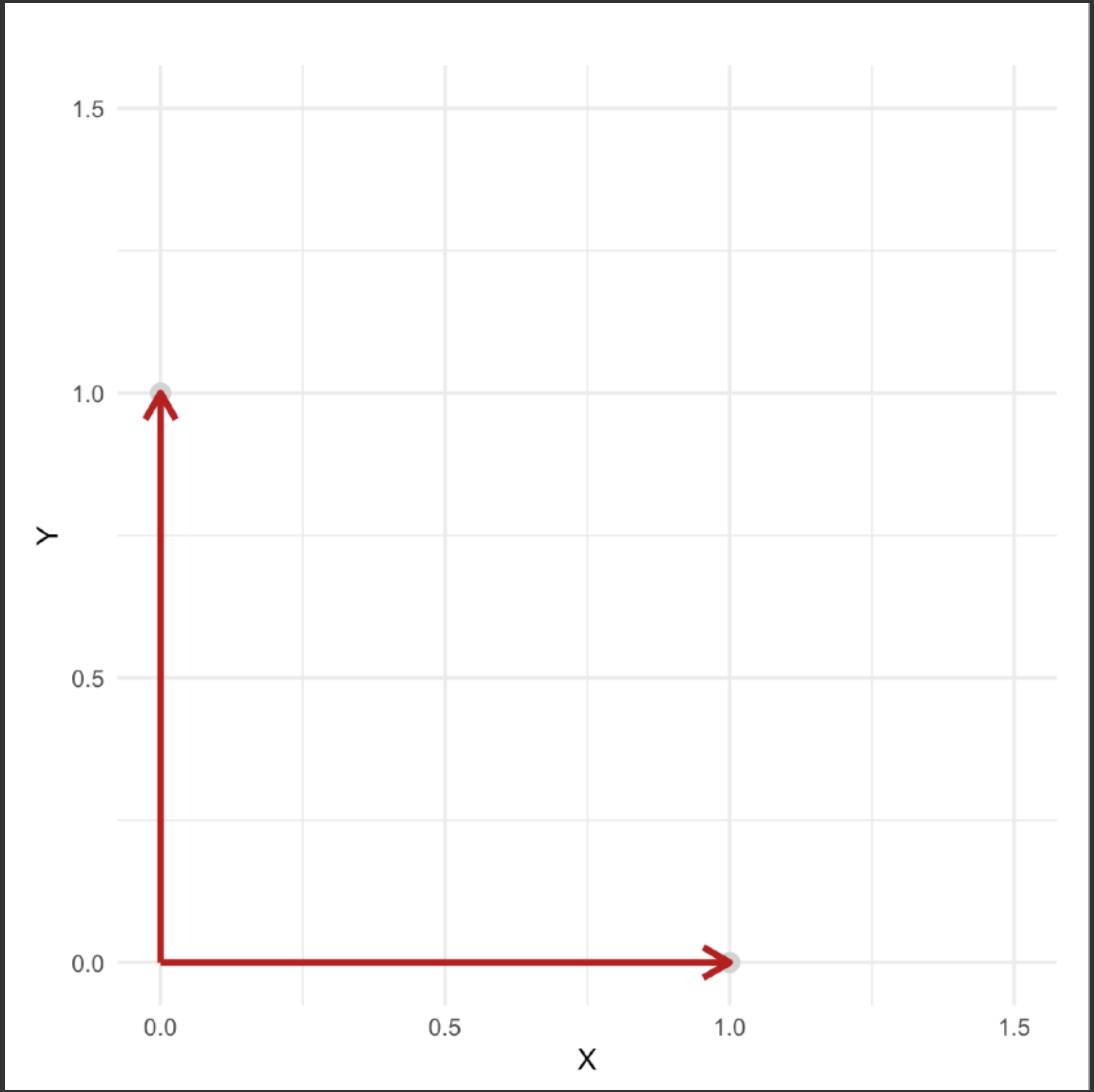
example



- 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:

$$\begin{bmatrix} a \\ b \end{bmatrix} = a \begin{bmatrix} 1 \\ 0 \end{bmatrix} + b \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

example



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$$\begin{bmatrix} a \\ b \end{bmatrix} = a \begin{bmatrix} 1 \\ 0 \end{bmatrix} + b \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$
- We also note that $\vec{x}$ and $\vec{y}$ are linearly independent since the only solution to
$$c_1\vec{x} + c_2\vec{y} = 0 \text{ is } c_1 = c_2 = 0$$