Which of the following sets of vectors are linearly independent in $\mathbb{R}^2$?

X A. $\left\{\begin{bmatrix}0\\0\end{bmatrix}, \begin{bmatrix}0\\1\end{bmatrix}\right\}$ (LD)

✓ B. $\left\{\begin{bmatrix}0\\1\end{bmatrix}\right\}$ (LI)

X C. $\left\{\begin{bmatrix}2\\4\end{bmatrix}, \begin{bmatrix}1\\2\end{bmatrix}, \begin{bmatrix}7\\5\end{bmatrix}\right\}$ → (LD)

$\begin{bmatrix}2\\4\end{bmatrix} = (2)\begin{bmatrix}1\\2\end{bmatrix} + (0)\begin{bmatrix}7\\5\end{bmatrix}$

X D. $\left\{\begin{bmatrix}0\\0\end{bmatrix}\right\}$ (LD)

$A = \left\{ \begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \end{bmatrix} \right\} \in \mathbb{R}^2$.

$\begin{bmatrix} 0 \\ 0 \end{bmatrix} = c_1 \begin{bmatrix} 0 \\ 1 \end{bmatrix}$

$c_1 = 0$

$\begin{bmatrix} 0 \\ 0 \end{bmatrix} = (0) \begin{bmatrix} 0 \\ 1 \end{bmatrix}$

(*) Any set containing a zero vector is always L.D.

B. $\left\{ \begin{bmatrix} 0 \\ 1 \end{bmatrix} \right\}$

$c_1 \begin{bmatrix} 0 \\ 1 \end{bmatrix} = 0$ [vector eqn: $c_1 v_1 + c_2 v_2 + \cdots + c_n v_n = 0$]

↓

only when $c_1 = 0$

For what value(s) of λ will the given set of vectors be linearly independent?

$$\left\{\begin{bmatrix}1\\2\end{bmatrix}, \begin{bmatrix}2\\\lambda\end{bmatrix}\right\}$$

A. $\lambda = 4$

B. $\lambda \neq 4$

C. $\lambda = 2$

D. $\lambda = 6$

$$\left\{\begin{bmatrix}1\\2\end{bmatrix}, \begin{bmatrix}2\\6\end{bmatrix}\right\}$$

$$\begin{bmatrix}2\\6\end{bmatrix} \neq c \begin{bmatrix}1\\2\end{bmatrix}$$

$$\begin{bmatrix}1\\2\end{bmatrix} \neq c \begin{bmatrix}2\\6\end{bmatrix}$$

$$\left\{\begin{bmatrix}1\\2\end{bmatrix}, \begin{bmatrix}2\\3\end{bmatrix}\right\}$$

c. $\lambda = 2$

$$\left\{\begin{bmatrix}1\\2\end{bmatrix}, \begin{bmatrix}2\\2\end{bmatrix}\right\}$$

$$\begin{bmatrix}1\\2\end{bmatrix} \neq c_1 \begin{bmatrix}2\\2\end{bmatrix}$$

$$\begin{bmatrix}2\\2\end{bmatrix} \neq c_2 \begin{bmatrix}1\\2\end{bmatrix}$$

B. $\lambda \neq 4$

$$\left\{\begin{bmatrix}1\\2\end{bmatrix}, \begin{bmatrix}2\\3\end{bmatrix}\right\}$$

$$\begin{bmatrix}1\\2\end{bmatrix} \neq c_1 \begin{bmatrix}2\\3\end{bmatrix}$$

$$\begin{bmatrix}2\\3\end{bmatrix} \neq c_2 \begin{bmatrix}1\\2\end{bmatrix}$$