

1. Let  $B$  be the list

$$\left\langle \begin{pmatrix} 1 \\ 1 \end{pmatrix}, v \right\rangle.$$

Which of the following vectors  $v \in \mathbb{R}^2$  will make  $B$  a basis for  $\mathbb{R}^2$ ?

(A)  $v = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$

(B)  $v = \begin{pmatrix} -1 \\ 1 \end{pmatrix}$

(C) Both (A) and (B)

(D) Neither (A) nor (B)

2. Let

$$B = \left\langle \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}, \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix} \right\rangle$$

and let  $U$  be the span of  $B$  inside  $\mathbb{R}^3$ . Let  $v$  be the vector in  $U$  such that

$$\text{Rep}_B(v) = \begin{pmatrix} 3 \\ -1 \end{pmatrix}.$$

Which of the following is  $v$ ?

- (A)  $(3, -1, 0)$
- (B)  $(-1, 3, 2)$
- (C)  $(3, -1, 2)$
- (D)  $(3, 0, -1)$

3. True or False?

There exists a basis  $B$  of  $\mathbb{R}^2$  such that

$$\text{Rep}_B \left( \begin{pmatrix} 1 \\ 3 \end{pmatrix} \right) = \begin{pmatrix} 3 \\ 1 \end{pmatrix}.$$