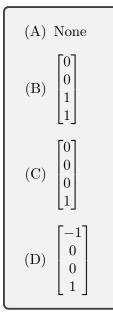
Problem 1. Linearly independent vectors

Consider this set S of vectors

$$\begin{bmatrix} 1 \\ 0 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} -1 \\ 0 \\ 0 \\ -1 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 0 \\ 1 \end{bmatrix}.$$

Which vector can you add to S and have the resulting set of vectors be linearly independent?



Problem 2. Guessing Dimensions

Suppose I have three vectors v_1, v_2, v_3 . What are possible values of

 $\dim(\operatorname{span}(\{v_1 + v_2, -v_1 - v_2, 0v_3\}))?$

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

Problem 3. Building a basis

Suppose I have a basis of \mathbb{R}^3 . Which of the following procedures reliably yields a basis of \mathbb{R}^4 ? (Several choices could be correct.)

- (A) Add a one as the last coordinate to each vector, e.g. taking (3, 4, 7), to (3, 4, 7, 1).
- (B) Add a one as the last coordinate to each vector, and add (0, 0, 0, 1) as an additional vector.
- (C) Add a one as the last coordinate to each vector, and add (1, 0, 0, 0) as an additional vector.
- (D) Add a zero as the last coordinate to each vector, e.g. taking (3, 4, 7), to (3, 4, 7, 0).

Problem 4. Dimension of the Space of Images

What's the dimension of the space of all 100×100 gray scale images?

- (A) 10,000
- (B) 100
- (C) However many gray scale levels there are
- (D) 0