1. **Property of a norm**

   We know that if \( f : v \to \mathbb{R} \) is a norm, then \( f(\lambda x) = |\lambda| f(x) \). Prove this.

2. **True or False?**

   Can three vectors in the \( \mathbb{R}^2 \) plane have \( u \cdot v < 0 \) and \( v \cdot w < 0 \) and \( u \cdot w < 0 \)?
3. Transformations

(a) You would like to unwrap a matrix

$$A_{\text{matrix}} = \begin{bmatrix} A_{1,1} & A_{1,2} \\ A_{2,1} & A_{2,2} \end{bmatrix}$$

to get the vector, $A_{\text{vector}} = \begin{bmatrix} A_{1,1} & A_{1,2} & A_{2,1} & A_{2,2} \end{bmatrix}^T$. Can you construct a matrix (or a set of matrices) that can achieve this?

(b) You would like to extract a subsequence of a vector to do computations over it. For instance, you’d like to extract $[x_i, x_{i+1}, \ldots, x_{i+m}]^T$ from a vector $X = [x_1, x_2, \ldots, x_N]^T$. Find a set of matrix transformations you would need to do this.