A square matrix is *symmetric* if it stays the same after reflecting all of the entries across the top-left-to-bottom-right diagonal. For example, the following matrix is symmetric.

$$\begin{pmatrix} 1 & 3 & 4 \\ 3 & 2 & 7 \\ 4 & 7 & 5 \end{pmatrix}$$

1. True or False?

The set of symmetric $n \times n$ matrices is a subspace of $\mathcal{M}_{n\times n}$.

2. True or False?

The complex numbers are a vector space.

3. True or False?

The following vectors span $\mathbb{R}^3$.

$$\begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}, \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix}, \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$$

4. True or False?

$\mathcal{P}_2$ can be spanned by three polynomials all of which have degree 2.

5. True or False?

The following set of vectors in $\mathbb{R}^3$ is linearly independent.

$$\left\{ \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}, \begin{pmatrix} 2 \\ 3 \\ 4 \end{pmatrix}, \begin{pmatrix} 3 \\ 4 \\ 5 \end{pmatrix} \right\}$$