Name: ____________________

Section: ____________________

1. Consider the linear transformation which rotates the plane by $\pi/2$ degrees clockwise:

$$R : \mathbb{R}^2 \to \mathbb{R}^2$$

$$\mathbf{x} \mapsto \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix} \mathbf{x}$$

   (a) Find the eigenvalues of $[R]$

   (b) For each eigenvalue find a basis for its eigenspace

2. For each, give an example of the following, or explain why it can't exist:

   (a) A 3×3 matrix, A with real entries but no real eigenvalues.

   (b) A 3×3 matrix with real entries and exactly 1 real eigenvalue.