Linear algebra II
Tutorial problems #1

1. Find the eigenvalues and the eigenvectors of the matrix

$$A = \begin{bmatrix} 1 & 1 & 2 \\ 0 & 1 & 0 \\ 2 & 3 & 1 \end{bmatrix}.$$

2. Let $a \in \mathbb{R}$ be some fixed number. Show that the matrix

$$A = \begin{bmatrix} a & 1 & 0 \\ 0 & a & 1 \\ 0 & 0 & a \end{bmatrix}$$

has only one eigenvalue and only one linearly independent eigenvector.

3. Is the following matrix diagonalizable? Why or why not?

$$A = \begin{bmatrix} 4 & 1 \\ -1 & 2 \end{bmatrix}.$$