1) Find an eigenvector for the matrix below.

$$\begin{bmatrix} 1 & 0 & 0 \\ 1 & 2 & 3 \\ 0 & 2 & 4 \end{bmatrix}$$

2) How many eigenvalues does the matrix below have? Be as thorough as possible without actually finding the eigenvalues.

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