1. Answer the following questions about $A \in \mathbb{R}^{3\times 3}$ below.

$$A = \begin{pmatrix} 1 & -1 & 1 \\ 0 & 0 & 0 \\ 0 & 1 & 2 \end{pmatrix}.$$

(a) Find the eigenvalues of $A$. *[4 points]*

(b) Calculate the eigenvectors of $A$ for the two smallest eigenvalues. *[6 points]*