Assume $\mathbb{N}, \mathbb{Q}, \mathbb{R}$ are used in the usual sense. We are using same notations as in class. $\mathcal{L}(S)$ denotes the linear span of S, and $\mathcal{E}_m$ denotes the standard basis of $\mathbb{R}^m$.

Problem I. Compute an eigenbasis. Find an orthonormal eigenbasis (if any) for the following matrix:

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