Problem 1. For the following matrix A, determine if it is diagonalizable and if so diagonalize it, i.e. find an invertible matrix P such that $P^{-1}AP$ is a diagonal matrix.

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