Let $M=\left[\begin{array}{c}4 -1 -9 -5\\3 -2 -5 -3\\3 0 -7 -3 \\0 -1 1 -1\end{array}\right]$

1. Show that the column vector $\left[7, 5, 3, 2\right]^{T}$ is an eigenvector for $M.$
2. Find the eigenvalues for $M.$
3. Determine whether or not $M$ is diagonalisable over $R,$ justifying your assertion and showing any necessary calculations *in full.*