

True or false (and give a proof of your answer): There exists $T \in \mathcal{L}(\mathcal{R}^3)$ s.t. T is not self-adjoint but there is a basis of \mathcal{R}^3 consisting of eigenvectors of T .

The real spectral theorem suggests that if a map is self-adjoint, it must have an orthogonal basis of eigenvalues. Thus, we can choose a map which does not have an orthogonal basis of eigenvalues.