

Practice Problems

MATH2055: Advanced Linear Algebra Tutorial 9

Eigenstuff

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Question 1 - Eigenstuff of Rotation Matrix

(Treil 4.1.3) Compute the eigenvalues, eigenvectors, and eigenspaces for the 2D rotation matrix:

$$R := \begin{bmatrix} \cos \alpha & -\sin \alpha \\ \sin \alpha & \cos \alpha \end{bmatrix}$$

Question 2 - Eigenvalues of Nilpotent Operator

(Treil 4.1.6) An operator is called *nilpotent* if $A^k = 0$ for some $k \in \mathbb{N}$. Show that $\theta = 0$ is the only eigenvalue for A .

Question 3 - Determinant is Product of Eigenvalues

(Treil 4.1.10) Prove that the determinant of a matrix A is equal to the product of its eigenvalues.