

[MATH2605] Practice Problems 2

Problem 1

If $\mathbf{A} \in \mathbb{R}^{14 \times 10}$ has the rank 8, how many independent vectors \mathbf{x} satisfy $\mathbf{Ax} = \mathbf{0}$?

Problem 2

Show that $\mathbf{x} - \mathbf{y}$ and $\mathbf{x} + \mathbf{y}$ are orthogonal if and only if $\|\mathbf{x}\| = \|\mathbf{y}\|$.

Problem 3

Compute \mathbf{A}^{100} , where

$$\mathbf{A} = \begin{bmatrix} 4 & 3 \\ 1 & 2 \end{bmatrix}.$$

Problem 4

Suppose that $\mathbf{A} \in \mathbb{R}^{3 \times 3}$ has eigenvalues 1, 2, 3. What is the trace of \mathbf{A} ? What is the determinant of \mathbf{A} ?

Problem 5

Suppose that $\mathbf{A} \in \mathbb{R}^{3 \times 3}$ is an upper triangular matrix. Show that the diagonals of \mathbf{A} are eigenvalues.