

IGEE-UMBB
EE 174 : Recitations set 6

1. Given the matrix $A = \begin{pmatrix} 1 & -1 & 1 \\ 1 & 1 & -1 \\ -1 & -1 & 1 \end{pmatrix}$

a) Determine the rank and nullity of A ; What can you conclude about A ?

b) Find possible bases for the range space $\mathcal{R}(A)$ and determine if $Y = \begin{pmatrix} 2 \\ 0 \\ 0 \end{pmatrix}$ is a

vector of $\mathcal{R}(A)$

c) Find a basis for the null space $\mathcal{N}(A)$

2. Consider the matrix $A = \begin{pmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{pmatrix}$ representing the linear transformation T in \mathbb{R}^2

(a) What is this transformation geometrically?

b) Determine its rank and nullity; What do you conclude?

3. Let $A = \begin{pmatrix} a_1 & a_2 & \dots & a_n \end{pmatrix}$ and $B = \begin{pmatrix} b_1 \\ b_2 \\ \vdots \\ b_n \end{pmatrix}$; Compute AB and BA and comment

your result. What are the rank and nullity of BA ? Comment.

4. Consider the matrix $A = \begin{pmatrix} 1 & 0 & 2 \\ 2 & -1 & 3 \\ 4 & 1 & 8 \end{pmatrix}$

a) Compute the determinant of A

b) Let the matrix B be obtained from A by replacing the second row of A by the sum of the second and third rows of A ; Compute $\det(B)$ and comment.

c) Compute the inverse of A if it exists.