

Unit No 1

1. Write a python program for addition subtraction multiplication of complex numbers $4+2j$ and $3-6j$.
2. Define : Galois Field, Dot Product, convex combination, span,
3. Write a python program to find conjugate of complex number.
4. Are the following vectors are linearly dependent $v_1=(3, 2, 7)$, $v_2=(2,4,1)$ and $v_3=(1,-2,6)$
5. Check whether the vectors are linearly dependent $v_1=(1, -2, 1)$, $v_2=(2, 1, -2)$ and $v_3=(7, -4, 1)$
6. Express in polar and exponential form $1 + i\sqrt{3}$
7. Find the square root of complex number $8 - 6i$
8. Find the square root of complex number $-5 + 12i$
9. Find the Square root of $21 - 20i$, where $i = \sqrt{-1}$
10. Express $[(3 + 2i)/(2 + i)(1 - 3i)]$ in the form $x + iy$
11. Solve the following system by backward substitution method
 $1x_1 - 3x_2 - 2x_3 = 7$, $2x_2 + 4x_3 = 4$, $-10x_3 = 12$
12. Write a python program to solve system of linear equations given below
 $1x_1 - 3x_2 - 2x_3 = 7$, $2x_2 + 4x_3 = 4$, $-10x_3 = 12$
13. Determine whether $v_1=(2, 2, 2)$, $v_2=(0, 0, 3)$ and $v_3=(0, 1, 1)$ span vector space R^3 .
14. Show that vectors $v_1=(1, 0, 1)$, $v_2=(2, 1, 4)$ and $v_3=(1, 1, 3)$ do not span vector space.
15. Write a python Program for rotating a complex number $Z = 2+3i$ by 180° .
16. Write a Python program to rotate a complex no by 90° , 180° and 270°
17. Which of the following is a set of generators of R^3
i) $\{(4, 0, 0), (0, 0, 2)\}$ ii) $\{(1, 0, 0), (0, 1, 0), (0, 0, 1)\}$
18. Express the following as a linear combination of $v_1=(-2, 1, 3)$, $v_2=(3, 1, -1)$ and $v_3=(-1, -2, 1)$ with $w = (6, -2, 5)$

Unit No 2

1. Define : Identity matrix, Symmetric Matrix, Null Space, Inner Product, Outer Product, Forest, Spanning Subgraph, Spanning Subgraph, cycle, path, Basis, Row rank of Matrix, Column rank of Matrix.
2. Prove that, For any vector $v \in V$; there is exactly one representation of v in terms of the basis vectors. If a_1, a_2, \dots, a_n be a basis for a vectorspace V .
3. Find the co-ordinate representation of $v=[1,3,5,3]$ in terms of $a_1=[1,1,0,0]$ in terms of $a_1 = [1,1,0,0]$, $a_2=[0,1,1,0]$, $a_3=[0,0,1,1]$
4. Find the co-ordinate representation of $v=[0,0,0,1]$ in terms of the vectors $[1,1,0,1]$, $[0,1,0,1]$ and $[1,1,0,0]$ in $GF(2)$
5. Write a program in python to multiply two matrices using nested loops.
6. Write python code to print diagonal matrix with diagonal elements $[1,2,3,4]$
7. Find the null space of matrix $A = \begin{bmatrix} 1 & 5 & 6 \\ 2 & 6 & 8 \\ 3 & 4 & 7 \end{bmatrix}$
8. Write dot product definition of matrix-vector multiplication with an example.
9. Write dot product definition of vector-matrix multiplication with an example.
10. Write a python code to check whether a given matrix $M = \begin{bmatrix} 1,3,5 \\ 3,2,4 \\ 5,4,1 \end{bmatrix}$

is a symmetric matrix.

11. Find the dimension of the vector space spanned by the vectors $(1, 1, -2, 0, -1)$,
12. $(1, 2, 0, -4, 1)$, $(0, 1, 3, -3, 2)$, $(2, 3, 0, -2, 0)$ and also find the basis.
13. Check whether the set of functions are Linearly independent?
14. $2 - x + 4x^2$, $3 + 6x + 2x^2$, $2 + 10x - 4x^2$.
15. Write a python program to enter a matrix and check if it is invertible.
if invertible exists then find inverse.
16. Show that vector $\{(1, 2, 1), (2, 1, 0), (1, -1, 2)\}$ of \mathbb{R}^3 form a basis of \mathbb{R}^3