Program Title & User Guide

Command Window

```
                A PROGRAM TO CALCULATE POWERS OF A MATRIX AND

                MATRIX POLYNOMIALS USING DIAGONALIZATION TRANSFORMATION.


Note 1. : Only square matrices, n×n, can be diagonalized.

Note 2. : This program allows complex numbers.
```

Inputs Given to the Program

- ***Dimension of Input Matrix***

```
Enter the dimension of your square matrix.
2
```

- ***Input Matrix***

Row 1

```
Enter a11 :
i
Enter a12 :
1-i
```

Row 2

```
Enter a21 :
3
Enter a22 :
2*i
```

Outputs of the Program

- **User Entered Matrix**

```
The Matrix You Entered :

ans =


[1i, 1 - 1i]
[ 3,     2i]
```

- **Test : Matrix is Diagonalizable or Not**

```
===> Matrix is Diagonalizable. <===
```

- **The Modal Matrix**

```
The Modal Matrix :

ans =


[-1, 1]
[ 1, 1]


Note : The column vector(s) of this modal matrix are the eigen vectors of the given matrix.
```

- **The Diagonal/Spectral Matrix**

```
The Diagonal or Spectral Matrix :

ans =


[- 2 + 2i,      0]
[       0, 2 + 1i]


Note : The diagonal element(s) of this diagonal matrix are the eigen values of the given matrix.
```

- **Time Taken**

```
Time taken in the calculation of modal & spectral matrices = 0.00801 seconds.
```

Option 1 Selected

```
Select an option:
1. Calculate Matrix Power.
2. Calculate Matrix Polynomial.
3. Exit.
Your choice :
1

Enter the power of the matrix.
5

5th power of given matrix is :

ans =

[    48 - 77i,   13 + 89i]
[- 114 + 153i, - 3 - 115i]
```

Option 2 Selected

```
Select an option:
1. Calculate Matrix Power.
2. Calculate Matrix Polynomial.
3. Exit.
Your choice :
2

Enter the matrix polynomial without constant term.
x^2 + x

Enter constant term, if not then enter 0.
1

Value of the matrix polynomial for the given matrix is :
ans =


[3 - 2i, 4 + 2i]
[3 + 9i,    -1i]
```

- **Time Taken in the Computation of Selected Option & Total Time Taken**

```
Time taken in the calculation of option 1 = 0.00353 seconds.
Total time taken = 0.01154 seconds
```

```
Time taken in the calculation of option 2 = 0.13088 seconds.
Total time taken = 0.13890 seconds
```