

# Matrix Calculator

## 1 Introduction

Matrix mathematics plays a fundamental role in a wide range of scientific and engineering fields, from using the matrix algebra various complex problems can be solved easily. At some stages the operations may take very complex and lengthy calculation to solve. To address the growing need for a versatile and user-friendly matrix calculator, I present the "Matrix Calculator" project.

### 1.1 Project Overview

The Matrix Calculator is a versatile tool designed to perform a wide range of matrix operations, simplifying complex mathematical tasks involving matrices. This project was developed to provide an accessible and efficient solution for working with matrices.

### 1.2 Purpose and Significance

Matrix operations, such as addition, subtraction, multiplication, and the determination of properties like symmetry and orthogonality. The Matrix Calculator project aims to:

- Provide a user-friendly terminal based interface for performing essential matrix operations.
- Offers various matrix operations related to its algebra and properties.
- Serve as an educational resource, helping students and learners grasp the principles of matrix mathematics.

With the Matrix Calculator, users can save their time, and eliminate the potential for human error in manual calculations. This documentation comprehensively explains the functionalities of the Matrix Calculator, how to use it, and the mathematics behind each operation.

## 2 Functionality

This project computes following these tasks on matrix:

```
Welcome to matrix calculator
Enter 1st matrix
Enter element at 1,1
1
Enter element at 1,2
2
Enter element at 1,3
3
Enter element at 2,1
4
Enter element at 2,2
5
Enter element at 2,3
6
Enter element at 3,1
7
Enter element at 3,2
8
Enter element at 3,3
9
Enter 2nd matrix
```

Figure 1: Matrix Calculator taking input

- Matrix addition
- Matrix subtraction
- Matrix multiplication
- Transpose of a matrix
- Square matrix
- Symmetric matrix check
- Skew-symmetric matrix check
- Orthogonal matrix check

### 3 Screenshots

This section shows the screenshots of output terminal and demonstrate how the user will interact with the project and insert a matrix and can perform desired operation.

```

Choose an option
1.Addition
2.Substraction
3.Multiplication
4.Transpose of matrix
5.Square of a matrix
6.Properties of Matrix
7.Exit
Enter your choice:
1
Addition of two matrix is:
-----
2 3 4
5 6 7
8 9 10
-----

```

Figure 2: Matrix Calculator performing Addition

```

-----
Choose an option
1.Addition
2.Substraction
3.Multiplication
4.Transpose of matrix
5.Square of a matrix
6.Properties of Matrix
7.Exit
Enter your choice:
2
Substraction of two matrix is:
-----
0 1 2
3 4 5
6 7 8
-----

```

Figure 3: Matrix Calculator performing Subtraction

```

-----
Choose an option
1.Addition
2.Substraction
3.Multiplication
4.Transpose of matrix
5.Square of a matrix
6.Properties of Matrix
7.Exit
Enter your choice:
3
Multiplication of 2 matrices is:
-----
6 6 6
15 15 15
24 24 24
-----

```

Figure 4: Matrix Calculator performing Multiplication

```

-----
Choose an option
1.Addition
2.Substraction
3.Multiplication
4.Transpose of matrix
5.Square of a matrix
6.Properties of Matrix
7.Exit
Enter your choice:
6
Properties of Matrix 1st
Symmetric - No
Skew Symmetric - No
Orthogonal - No
Properties of Matrix 2nd:
Symmetric - Yes
Skew Symmetric - No
Orthogonal - No

```

Figure 5: Matrix Calculator in action - properties

## 4 Conclusion

Although this project is performing important operation of matrix but it can be expanded for the wider range of tasks as rank, eigen values, system of linear equations etc.