**README:**

**Matrix Library – User Manual**

This is the user manual for the semester project “Matrix Library,” created in Python 3.8.5.

Matrices are treated here as 2D arrays.

**Functions:**

• def generate(self, n, m, x=0)

Generates an n × m matrix; x is placed on the main diagonal (default: 0)

• def to\_list(self)

Creates a copy of the matrix as a list

• def \_\_getitem\_\_(self, key)

Returns the element A[i][j], e.g., print(A[0][2])

• def print(self)

Prints the rows of the matrix line by line, e.g., A.print()

• def \_\_eq\_\_(self, other)

Equality check, e.g., print(A == B)

• def \_\_ne\_\_(self, other)

Inequality check, e.g., print(A != B)

• def \_\_add\_\_(self, other)

Matrix addition, e.g., (A + B).print()

• def \_\_sub\_\_(self, other)

Matrix subtraction, e.g., (A - B).print()

• def \_\_mul\_\_(self, other)

Matrix multiplication, e.g., (A \* B).print()

• def transpose(self)

Transposes the matrix

• def symmetry(self)

Checks for symmetry

• def row\_swap(self, i, j)

Swaps rows i and j

• def row\_multiply(self, i, x)

Multiplies row i by a non-zero number x

• def row\_add(self, i, j, x)

Adds x times row i to row j

• def \_REF(self)

Converts the matrix to REF (Row Echelon Form)

• def REF(self)

Returns a copy of the matrix in REF form

• def rref\_and\_inverse(self)

Returns the RREF (Reduced Row Echelon Form) and the inverse matrix

• def RREF(self)

Returns a copy of the matrix in RREF form

• def inverse(self)

Returns the inverse of a copy of the matrix