GAUSS JORDAN IMPLEMENTATION IN PYTHON

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ASSIGNMENT 3B

NUMERICAL METHODS (CS-406)

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import numpy as np

# Read matrix A and vector b from user input

n = *int*(input("Enter the size of the matrix and vector: "))

A = np.zeros((n,n))

b = np.zeros(n)

for i in range(n):

    row = input(f"Enter the coefficients of row {i+1} of matrix A, separated by spaces: ")

    A[i,:] = np.array([*float*(x) for x in row.split()])

    b[i] = *float*(input(f"Enter the constant term for row {i+1} of vector b: "))

def gauss\_jordan(*A*, *b*):

    n = len(b)

    # Forward elimination

    for k in range(n):

        pivot = A[k,k]

        for j in range(k, n):

            A[k,j] /= pivot

        b[k] /= pivot

        for i in range(n):

            if i != k:

                factor = A[i,k]

                for j in range(k, n):

                    A[i,j] -= factor \* A[k,j]

                b[i] -= factor \* b[k]

        # Print intermediate results

        print("Step ", k+1, ":")

        print(A)

        print(b)

    return b

# Call the Gauss-Jordan function and print the result

x = gauss\_jordan(A, b)

print("Solution: ", x)

SAMPLE OUTPUT

Enter the size of the matrix and vector: 3

Enter the coefficients of row 1 of matrix A, separated by spaces: 2 1 -1

Enter the constant term for row 1 of vector b: 8

Enter the coefficients of row 2 of matrix A, separated by spaces: -3 -1 2

Enter the constant term for row 2 of vector b: -11

Enter the coefficients of row 3 of matrix A, separated by spaces: -2 1 2

Enter the constant term for row 3 of vector b: -3

Step 1:

[[ 1. 0.5 -0.5]

[ 0. 1. -1. ]

[ 0. 0. 1. ]]

[ 4. -1. 1.]

Step 2:

[[ 1. 0. 0.]

[ 0. 1. 0.]

[ 0. 0. 1.]]

[ 2. -1. 1.]

Solution: [ 2. -1. 1.]