

LU Decomposition

' AIM:

To write a program to find the LU Decomposition of a matrix.

' Equipments Required:

1. Hardware – PCs
2. Anaconda – Python 3.7 Installation / Moodle-Code Runner

' Algorithm

Step 1: Import the numpy module to use the built-in functions for calculation

Step 2: Prepare the lists from each linear equations and assign in np.array()

Step 3: Using the np.linalg.solve(), we can find the solutions.

Step 4: End the program

' Program:

(i) To find the L and U matrix

```
/*  
Program to find the L and U matrix.  
Developed by: Aldrin Lijo J E  
RegisterNumber: 22008844  
*/
```

```
import numpy as np  
from scipy.linalg import lu  
A = np.array(eval(input()))  
P,L,U=lu(A)  
print(L)  
print(U)
```

(ii) To find the LU Decomposition of a matrix

```

/*
Program to find the LU Decomposition of a matrix.
Developed by:
RegisterNumber:
*/

```

```

import numpy as np
from scipy.linalg import lu_factor, lu_solve
A = np.array(eval(input()))
b = np.array(eval(input()))
lu, piv = lu_factor(A)
x = lu_solve((lu, piv), b)
print(x)

```

Output:

	Input	Expected	Got	
✓	[[3, 2, 7], [2, 3, 1], [3, 4, 1]] [4, 5, 7]	[0.875 1.125 -0.125]	[0.875 1.125 -0.125]	✓

Passed all tests! ✓

	Input	Expected	Got	
✓	[[3, 2, 7], [2, 3, 1], [3, 4, 1]]	[[1. 0. 0.] [1. 1. 0.] [0.66666667 0.83333333 1.]]	[[1. 0. 0.] [1. 1. 0.] [0.66666667 0.83333333 1.]]	✓
		[[3. 2. 7.] [0. 2. -6.] [0. 0. 1.33333333]]	[[3. 2. 7.] [0. 2. -6.] [0. 0. 1.33333333]]	
✓	[[5, 1, 8], [4, 5, 7], [8, 9, 1]]	[[1. 0. 0.] [0.625 1. 0.] [0.5 -0.10810811 1.]]	[[1. 0. 0.] [0.625 1. 0.] [0.5 -0.10810811 1.]]	✓
		[[8. 9. 1.] [0. -4.625 7.375] [0. 0. 7.2972973]]	[[8. 9. 1.] [0. -4.625 7.375] [0. 0. 7.2972973]]	

Passed all tests! ✓

Result:

Thus the program to find the LU Decomposition of a matrix is written and verified using python programming.