LU Decomposition without zero on the diagonal

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

1. step 1:start
2. step 2:get an input from user
3. step 3: display the value 4.step 4:stop

Program:

```
/*
Program to find the LU Decomposition of a matrix.
Developed by: thamaraiselvan v
RegisterNumber: 21001052
*/
```

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

```
import numpy as np
from scipy.linalg import lu_factor,lu_solve
```

```
A =eval(input())
B =eval(input())
lu,piv= lu_factor(A)
x= lu_solve((lu,piv),B)
print(x)
```

Output:

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```
'''Program to find L and U matrix using LU decomposition.
Developed by: thamaraiselvan v
RegisterNumber: 21001052
'''

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

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

Passed all tests! ✔

Input	Result
[[3, 2, 7], [2, 3, 1], [3, 4, 1]] [4, 5, 7]	[0.875 1.125 -0.125]

Answer: (penalty regime: 0 %)

Reset answer

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```
'''Program to solve a matrix using LU decomposition.
Developed by: thamaraiselvan v
RegisterNumber: 21001052
'''

# To print X matrix (solution to the equations)
import numpy as np
from scipy.linalg import lu_factor,lu_solve
A =eval(input())
B =eval(input())
lu,piv= lu_factor(A)
x= lu_solve((lu,piv),B)
print(x)
```

	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! ✔

Result:

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