

```
>> symmetricmatrix
```

```
Enter the size of the matrix
```

```
5
```

```
For a non-singular square matrix
```

15.9061	-0.1633	0.2613	-0.6688	1.9493
1.9682	37.7252	1.7638	0.8144	1.0839
-0.5361	-0.0684	21.1569	-0.3943	0.9453
0.5628	-1.5445	-0.8895	4.1802	-0.0455
1.5438	1.4024	1.6195	0.2545	20.6411

```
The decomposition of lower triangular matrix
```

1.0000	0	0	0	0
0.1237	1.0000	0	0	0
-0.0337	-0.0020	1.0000	0	0
0.0354	-0.0408	-0.0391	1.0000	0
0.0971	0.0376	0.0722	0.0747	1.0000

```
The decomposition of upper triangular matrix
```

15.9061	-0.1633	0.2613	-0.6688	1.9493
0	37.7454	1.7315	0.8972	0.8427
0	0	21.1690	-0.4150	1.0126
0	0	0	4.2242	-0.0405
0	0	0	0	20.3501

```
Check the values of L and U by matlab function
```

1.0000	0	0	0	0
0.1237	1.0000	0	0	0
-0.0337	-0.0020	1.0000	0	0
0.0354	-0.0408	-0.0391	1.0000	0
0.0971	0.0376	0.0722	0.0747	1.0000

15.9061	-0.1633	0.2613	-0.6688	1.9493
0	37.7454	1.7315	0.8972	0.8427
0	0	21.1690	-0.4150	1.0126
0	0	0	4.2242	-0.0405
0	0	0	0	20.3501

```
To find X, from AX=b
```

```
Random vector b
```

```
-1.6216
-0.5222
1.9431
0.7341
1.5525
```

```
value of g obatined from L and b
```

```
-1.6216
0.2007
1.4070
1.2969
3.0963
```

value of X obatined from U and g

```
-0.1020
0.0055
0.0698
0.3797
0.1522
```

For a symmetric positive definite matrix

```
75.1858    1.7825    1.0439    0.3940    1.7014
 1.7825  110.1597   -1.1208    0.1505   -0.3643
 1.0439   -1.1208   21.8664   -0.8291    0.2160
 0.3940    0.1505   -0.8291  181.2878   -1.7065
 1.7014   -0.3643    0.2160   -1.7065  128.2758
```

The decomposition of upper triangluar matrix

```
8.6710         0         0         0         0
0.2056   10.4937         0         0         0
0.1204   -0.1092    4.6733         0         0
0.0454    0.0134   -0.1783   13.4631         0
0.1962   -0.0386    0.0403   -0.1268   11.3233
```

The decomposition of lower triangluar matrix

```
8.6710    0.2056    0.1204    0.0454    0.1962
      0   10.4937   -0.1092    0.0134   -0.0386
      0         0    4.6733   -0.1783    0.0403
      0         0         0   13.4631   -0.1268
      0         0         0         0   11.3233
```

To check Cholskey decomposition using matlab function

```
8.6710    0.2056    0.1204    0.0454    0.1962
      0   10.4937   -0.1092    0.0134   -0.0386
      0         0    4.6733   -0.1783    0.0403
      0         0         0   13.4631   -0.1268
      0         0         0         0   11.3233
```

To find X, from $AX=b$

Random vector b

```
-1.6216
-0.5222
1.9431
0.7341
1.5525
```

value of g obatined from L and b

```
-0.1870
0.0384
0.6392
0.0838
0.2874
```

```
value of X obatined from U and g  
-0.0216  
0.0040  
0.1723  
0.0067  
0.0254
```

```
Correctness of the solution  
For a non-singluar matrix  
1.3463e-29
```

```
For a SPD matrix  
2.1458e-28
```

```
For non-singular AX=b  
2.1624
```

```
For symmetric AX=b  
2.5988
```

```
>>
```