

Eso208

Programming Assignment 2

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1. input1.txt

```
3
4 2 0 10
2 4 1 11.5
0 1 5 4.5
```

a) Gauss elimination

Enter the method you want to use

1. Guass Elimination(without pivoting)
2. Guass Elimination(with partial pivoting)
3. LU decomposition by Doolittle method (without pivoting)
4. LU decomposition by Crout method (without pivoting)
5. Cholesky decomposition (for symmetric positive definite matrix)

1

X =

```
1.5000
2.0000
0.5000
```

Name ^	Value
A	3x4 double
B	[8.2682,-0.0057,-...
cureerror	3.6868e-04
eigenvalue	2,4.5990,-1...
error	3.6868e-04
fid	21
filename	"output1.txt"
i	1
iter	9
j	2
k	2
line	'0 1 5 4.5'
merror	1.0000e-03
method	1
miter	100
outf	22
Q	[1.0000,0.0012,-5...
R	[8.2682,-0.0159,-...
size	3
value	8x5 double
X	[1.5000;2;0.5000]
ymod	1.8672

b) Gauss elimination (Partial Pivoting)

Enter the method you want to use

1. Guass Elimination(without pivoting)
2. Guass Elimination(with partial pivoting)
3. LU decomposition by Doolittle method (without pivoting)
4. LU decomposition by Crout method (without pivoting)
5. Cholesky decomposition (for symmetric positive definite matrix)

2

X =

```
1.5000
2.0000
0.5000
```

Name ^	Value
A	3x4 double
B	[8.2682,-0.0057,-...
cureerror	3.6868e-04
eigenvalue	[8.2682,4.5990,-1...
error	3.6868e-04
fid	23
filename	"output1.txt"
i	1
iter	9
j	2
k	2
line	'0 1 5 4.5'
merror	1.0000e-03
method	2
miter	100
outf	24
Q	[1.0000,0.0012,-5...
R	[8.2682,-0.0159,-...
size	3
value	8x5 double
X	[1.5000;2.0000;0...
ymod	1.8672

c) LU decomposition by Doolittle method (Without Pivoting)

Enter the method you want to use

1. Guass Elimination(without pivoting)
 2. Guass Elimination(with partial pivoting)
 3. LU decomposition by Doolittle method (without pivoting)
 4. LU decomposition by Crout method (without pivoting)
 5. Cholesky decomposition (for symmetric positive definite matrix)
- 3

Y =

0
0
0

L =

1.0000 0 0
0.5000 1.0000 0
0 0.3333 1.0000

U =

4.0000 2.0000 0
0 3.0000 1.0000
0 0 4.6667

X =

1.5000
2.0000
0.5000

Name ▲	Value
A	3x4 double
fid	9
filename	"output1.txt"
i	1
j	2
k	3
l	2
L	[4,0,0;2,3,0;0,1,4.6...
line	'0 1 5 4.5'
method	4
outf	10
p	2
s1	0.3333
s2	0.3333
size	3
U	[1,0.5000,0;0,1,0....
X	[1.5000;2.0000;0....
Y	[2.5000;2.1667;0....
~	~
L	[1,0,0;0.5000,1,0;...
line	'0 1 5 4.5'
method	3
outf	8
p	2
s1	0
s2	0.3333
size	3
U	[4,2,0;0,3,1;0,0,4.6...
X	[1.5000;2;0.5000]
Y	[10;6.5000;2.3333]

d) LU decomposition by Crout method (Without Pivoting)

Enter the method you want to use

1. Guass Elimination(without pivoting)
 2. Guass Elimination(with partial pivoting)
 3. LU decomposition by Doolittle method (without pivoting)
 4. LU decomposition by Crout method (without pivoting)
 5. Cholesky decomposition (for symmetric positive definite matrix)
- 4

Y =

0
0
0

L =

4.0000 0 0
2.0000 3.0000 0
0 1.0000 4.6667

U =

1.0000 0.5000 0
0 1.0000 0.3333
0 0 1.0000

X =

1.5000
2.0000
0.5000

e) Cholesky decomposition (for symmetric positive definite matrix)

Enter the method you want to use

1. Gauss Elimination(without pivoting)
2. Gauss Elimination(with partial pivoting)
3. LU decomposition by Doolittle method (without pivoting)
4. LU decomposition by Crout method (without pivoting)
5. Cholesky decomposition (for symmetric positive definite matrix)

5

Y =

0
0
0

L =

2.0000 0 0
1.0000 1.7321 0
0 0.5774 2.1602

Name ^	Value
A	3x4 double
ans	[2,1,0;0,1.7321,0,....
fid	11
filename	"output1.txt"
i	1
j	2
k	3
l	2
L	[2,0,0;1,1.7321,0;...
line	'0 1 5 4.5'
method	5
outf	12
p	2
s1	0.3333
s2	0.3333
size	3
U	[1,0.5000,0;0,1,0,....
X	[1.5000;2.0000;0,....
Y	[5;3.7528;1.0801]

ans =

```
2.0000 1.0000 0
0 1.7321 0.5774
0 0 2.1602
```

X =

```
1.5000
2.0000
0.5000
```

2. input.txt

```
3
8 -1 -1
-1 4 -2
-1 -2 -1
100
0.001
8
```

a) Power Method

Enter the method you want to use

1. Power method
2. Inverse power method
3. Inverse power method with shift
4. QR method

1

Give your input in a file named 'input2.txt'

FORMAT: Size of matrix

matrix

Maximum iterations

Maximum approximate relative error

Press ENTER to continue

z =

```
0.9778
-0.1998
-0.0624
```

(Error,Eigenvalue) is

value =

```
1.5505 8.2398
```

Name ^	Value
A	[8,-1,-1;-1,4,-2;-1,-2,-1,...
cureigenval	8.2682
cureigenvec	[8.0850;-1.6524;-...
curerror	6.1649e-04
eigenvalue	8.2682
error	6.1649e-04
fid	13
filename	"output2.txt"
i	3
iter	15
line	'0.001'
maxelement	0.9778
maxelpos	1
merror	1.0000e-03
method	1
miter	100
outf	14
size	3
value	14x2 double
y	[8.0850;-1.6524;-...
ymod	68.3630
z	[0.9778;-0.1998;-...
zmod	8.2682

0.1239 8.2602
 0.4008 8.2658
 0.1632 8.2674
 0.1173 8.2680
 0.0632 8.2681
 0.0368 8.2682
 0.0205 8.2682
 0.0115 8.2682
 0.0064 8.2682
 0.0036 8.2682
 0.0020 8.2682
 0.0011 8.2682
 0.0006 8.2682

eigenvalue =

8.2682

b) Inverse Power Method

Enter the method you want to use

1. Power method
 2. Inverse power method
 3. Inverse power method with shift
 4. QR method
- 2

Give your input in a file named 'input2.txt'

FORMAT: Size of matrix

matrix

Maximum iterations

Maximum approximate relative error

Press ENTER to continue

z =

-0.1288
 -0.3396
 -0.9317

(Error,Eigenvalue) is

value =

1.0e+03 *

0.1000 0.0071
 0.1784 0.0035
 1.8103 0.0020
 0.2047 0.0019
 0.2259 0.0019
 0.2008 0.0019
 0.2021 0.0019
 0.2001 0.0019

Name ^	Value
A	[8,-1,-1;-1,4,-2;-1,...
B	[0.1127,-0.0141,-...
cureigenval	1.8672
cureigenvec	[0.2406;0.6340;1....
curerror	200
eigenvalue	1.8672
error	200
fid	15
filename	"output2.txt"
i	3
iter	100
line	'0.001'
merror	1.0000e-03
method	2
miter	100
outf	16
size	3
1x1 double	99x2 double
y	[0.2406;0.6340;1....
ymod	3.4864
z	[-0.1288;-0.3396;...
zmod	0.5356

[illegible]

[illegible]

eigenvalue =

1.8672

c) Inverse Power Method with Shift

Enter the method you want to use

1. Power method
2. Inverse power method
3. Inverse power method with shift
4. QR method

3

Give your input in a file named 'input2.txt'

FORMAT: Size of matrix
matrix
Maximum iterations
Maximum approximate relative error
The scalar value to which the eigenvalue should be closest

Press ENTER to continue

z =

0.9778
-0.1999
-0.0624

(Error,Eigenvalue) is

value =

100.0000 8.2676
7.2541 8.2682
0.5375 8.2682
0.0472 8.2682
0.0039 8.2682
0.0003 8.2682

eigenvalue =

8.2682

d) QR method

Enter the method you want to use

1. Power method
2. Inverse power method
3. Inverse power method with shift
4. QR method
- 4

Give your input in a file named 'input2.txt'

FORMAT: Size of matrix
matrix
Maximum iterations
Maximum approximate relative error

Press ENTER to continue

(Iterations,Error,Eigenvalues) is

value =

1.0000 41.5720 8.2273 4.4842 -1.7115
2.0000 7.0467 8.2578 4.5835 -1.8413
3.0000 1.1620 8.2651 4.5978 -1.8629

Name ^	Value
A	[8,-1,-1;-1,4,-2;-1,...
B	[3.5556,-0.7778,-...
cureigenval	8.2682
cureigenvec	[8.0849;-1.6526;-...
curerror	3.1548e-04
eigenvalue	8.2682
error	3.1548e-04
fid	17
filename	"output2.txt"
i	3
iter	7
l	3
line	'8'
merror	1.0000e-03
method	3
miter	100
outf	18
size	3
theta	8
value	6x2 double
y	[8.0849;-1.6526;-...
ymod	68.3630
z	[0.9778;-0.1999;-...
zmod	3.7287

Name ^	Value
A	[8.2682,-0.0057,-...
B	[8.2682,-0.0057,-...
curerror	3.6868e-04
eigenvalue	[8.2682,4.5990,-1...
error	3.6868e-04
fid	19
filename	"output2.txt"
i	3
iter	9
j	3
k	2
line	'0.001'
merror	1.0000e-03
method	4
miter	100
outf	20
Q	[1.0000,0.0012,-5...
R	[8.2682,-0.0159,-...
size	3
value	8x5 double
ymod	1.8672

4.0000	0.1912	8.2672	4.5992	-1.8665
5.0000	0.0315	8.2679	4.5992	-1.8671
6.0000	0.0052	8.2681	4.5991	-1.8672
7.0000	0.0010	8.2682	4.5990	-1.8672
8.0000	0.0004	8.2682	4.5990	-1.8672

eigenvalue =

8.2682	4.5990	-1.8672
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