Eso208
Programming Assignment 2

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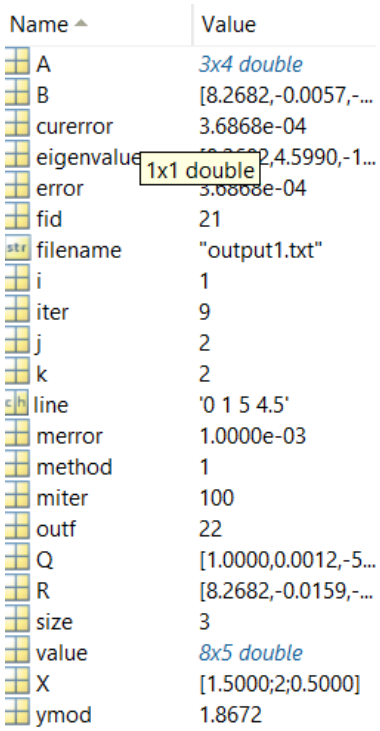
200705
Group: J4

1. input1.txt

```
3

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

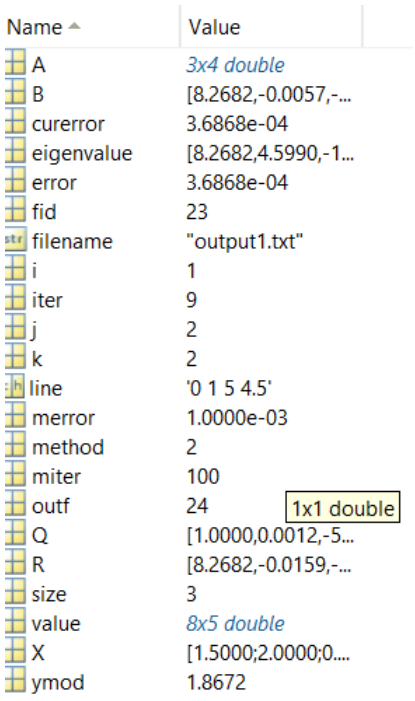


a) Gauss elimination

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



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

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 =

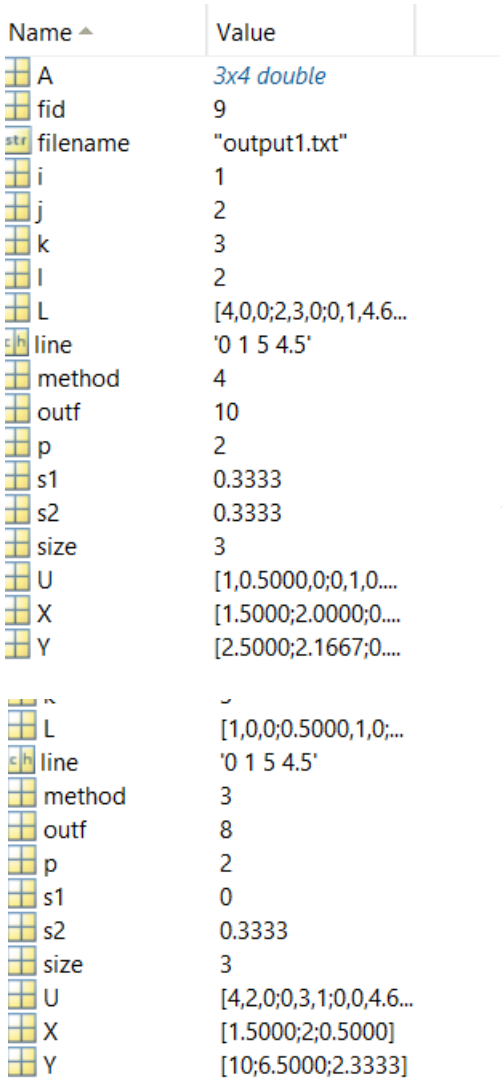
1.0000 0 0
0.5000 1.0000 0
0 0.3333 1.0000

U =

4.0000 2.0000 0
0 3.0000 1.0000
0 0 4.6667

X =

1.5000
2.0000
0.5000



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 =

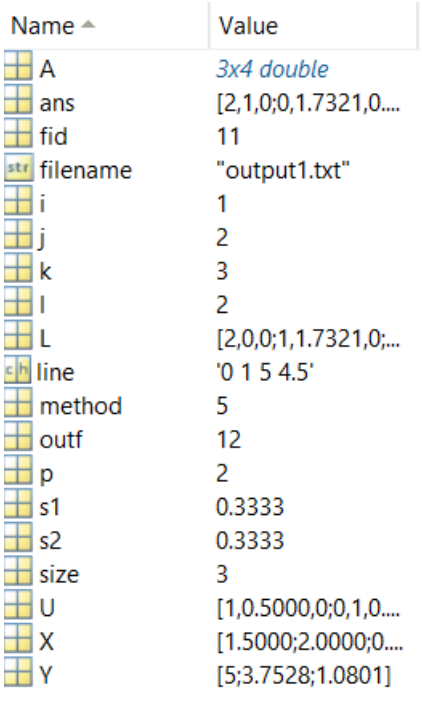
1.0000 0.5000 0
0 1.0000 0.3333
0 0 1.0000

X =

1.5000
2.0000
0.5000

e) Cholesky decomposition (for symmetric positive definite matrix)

Enter the method you want to use
1. 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)
5



Y =

0
0
0

L =

2.0000 0 0
1.0000 1.7321 0
0 0.5774 2.1602

ans =

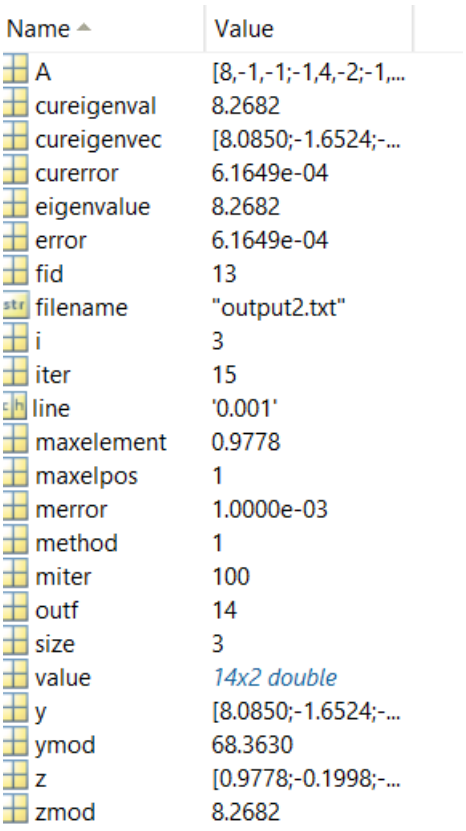
```
   2.0000    1.0000         0
        0    1.7321    0.5774
        0         0    2.1602
```

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
```

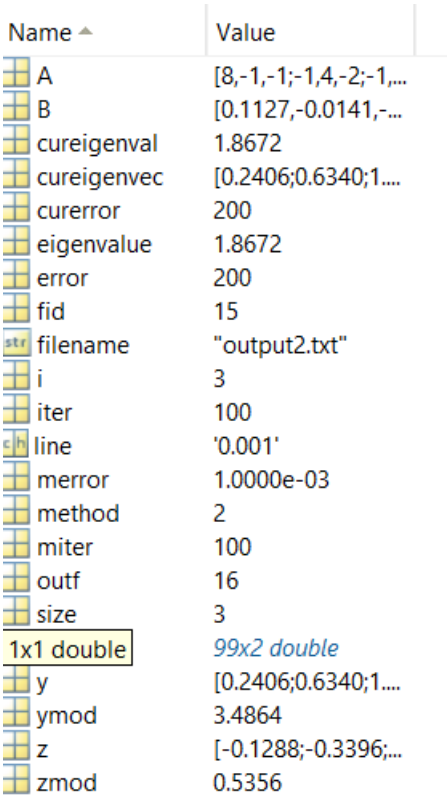
0.1239 8.2602
0.4008 8.2658
0.1632 8.2674
0.1173 8.2680
0.0632 8.2681
0.0368 8.2682
0.0205 8.2682
0.0115 8.2682
0.0064 8.2682
0.0036 8.2682
0.0020 8.2682
0.0011 8.2682
0.0006 8.2682

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

0.2004	*0.0019*
0.2000	*0.0019*
0.2001	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*
0.2000	*0.0019*

```
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019
    0.2000    0.0019


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

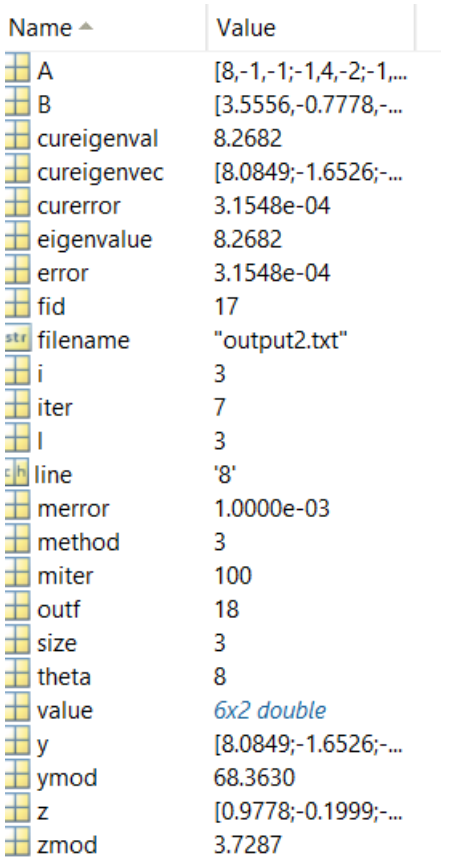
(Error,Eigenvalue) is

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



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

d) QR method

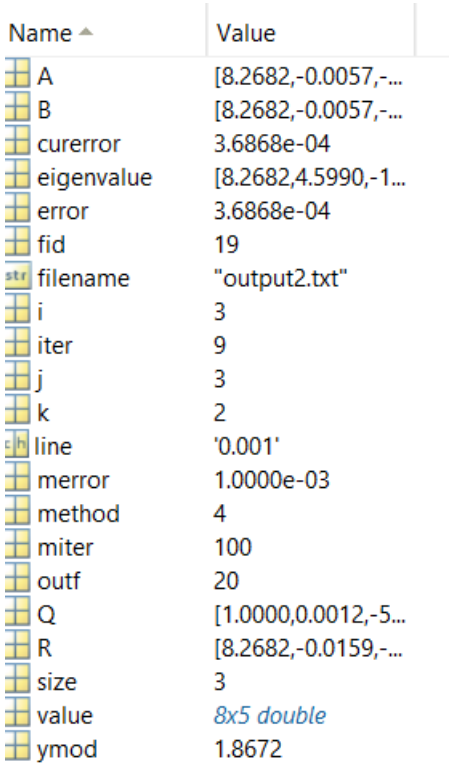
Enter the method you want to use
1. Power method
2. Inverse power method
3. Inverse power method with shift
4. QR method
4
Give your input in a file named 'input2.txt'
FORMAT: Size of matrix
matrix
Maximum iterations
Maximum approximate relative error

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	[8.2682,-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