2020 Scientific Computing , Computer Project 6

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I, II, III.

A.對角線上的數值即是 eigenvalue

```
57.29404363   0.00000010  -0.00000000   0.00000000
 0.00000010  -7.04727064  -0.00000000  -0.00000000
-0.00000000  -0.00000000  -9.11499626   0.00000000
 0.00000000  -0.00000000   0.00000000   8.86822327
```

B.每一個行向量都是 eigenvector

```
 0.62121789  -0.76878112  -0.09128909   0.12136815
 0.50722398   0.37018770  -0.48015385  -0.61248443
 0.45314317   0.24350304   0.84591299  -0.14070802
 0.38919589   0.46113222  -0.21342396   0.76833186
```

C.

```
error: ||A*v-lambda*v||
j=0: 0.0000000972
j=1: 0.0000000972
j=2: 0.0000000004
j=3: 0.0000000003
```

D.因為每一個 eigenvector 皆為線性獨立

```
< v_0, v_0 > : 1.0000000000
< v_0, v_1 > : 0.0000000000
< v_0, v_2 > : 0.0000000000
< v_0, v_3 > : 0.0000000000
< v_1, v_1 > : 1.0000000000
< v_1, v_2 > : 0.0000000000
< v_1, v_3 > : -0.0000000000
< v_2, v_2 > : 1.0000000000
< v_2, v_3 > : 0.0000000000
< v_3, v_3 > : 1.0000000000
```

E.

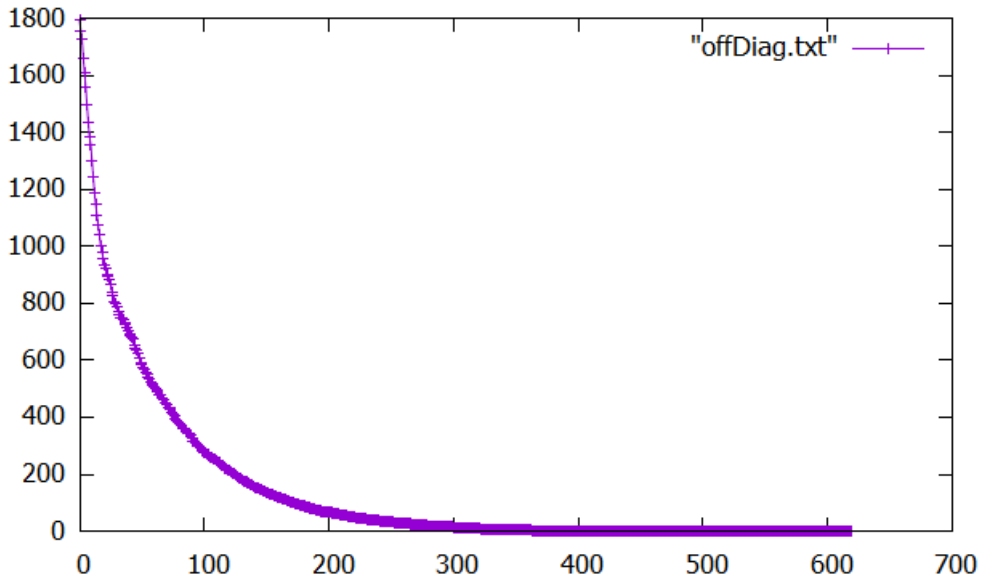
```
k=16, theta= -0.000000, matrix A[][]=

 57.29404363   0.00000010  -0.00000000   0.00000000
  0.00000010  -7.04727064  -0.00000000  -0.00000000
 -0.00000000  -0.00000000  -9.11499626   0.00000000
  0.00000000  -0.00000000   0.00000000   8.86822327
```

IV, V N = 20; iteration:620 `k=620, theta= -0.000000,`

eigenvalues:

193.15132538
-5.03042120
-15.45391203
-24.96116386
-4.03707227
-27.44659823
24.42261246
-7.52669405
31.21985942
-36.77622205
7.07567060
39.28194154
-45.93323511
48.81572043
0.39583143
-22.26987344
-13.89489109
25.96334495
19.91084915
15.09292794

the variation of Diag[k], k = 0,1,2,……,619:



VI.