Source code is listed in the zip file

These are the outputs

==========
==========
Running case p287 with alpha = 1
==========
==========

Original Matrix

```
 5.00  0.00  0.00  0.00       |     1.00
 0.00  5.00  0.00  0.00       |     3.00
 1.00  4.00 -3.00  0.00       |     4.00
-1.00 -2.00  0.00 -3.00       |     2.00
```

A-alphaI

```
 4.00  0.00  0.00  0.00       |     1.00
 0.00  4.00  0.00  0.00       |     3.00
 1.00  4.00 -4.00  0.00       |     4.00
-1.00 -2.00  0.00 -4.00       |     2.00
```

** Echelon Form **

```
 4.00  0.00  0.00  0.00       |     1.00
 0.00  4.00  0.00  0.00       |     3.00
 0.00  0.00 -4.00  0.00       |     0.75
 0.00  0.00  0.00 -4.00       |     3.75
```

** L **

```
 1.00  0.00  0.00  0.00       |     1.00
 0.00  1.00  0.00  0.00       |     3.00
 0.25  1.00  1.00  0.00       |     0.75
-0.25 -0.50  0.00  1.00       |     3.75
```

** LU Check **

```
 4.00  0.00  0.00  0.00       |     1.00
 0.00  4.00  0.00  0.00       |     3.00
 1.00  4.00 -4.00  0.00       |     0.75
-1.00 -2.00  0.00 -4.00       |     3.75
```

iter = 1 mu = -0.4375
iter = 2 mu = -0.142857
iter = 3 mu = -0.4375
iter = 4 mu = -0.142857
iter = 5 mu = -0.4375
iter = 6 mu = -0.142857
iter = 7 mu = -0.4375
iter = 8 mu = -0.142857
iter = 9 mu = -0.4375
iter = 10 mu = -0.142857
iter = 11 mu = -0.4375
iter = 12 mu = -0.142857
iter = 13 mu = -0.4375
iter = 14 mu = -0.142857
iter = 15 mu = -0.4375
iter = 16 mu = -0.142857
iter = 17 mu = -0.4375
iter = 18 mu = -0.142857
iter = 19 mu = -0.4375
iter = 20 mu = -0.142857
iter = 21 mu = -0.4375
iter = 22 mu = -0.142857
iter = 23 mu = -0.4375
iter = 24 mu = -0.142857
iter = 25 mu = -0.4375
iter = 26 mu = -0.142857
iter = 27 mu = -0.4375
iter = 28 mu = -0.142857

iter = 29 mu = -0.4375
iter = 30 mu = -0.142857
iter = 31 mu = -0.4375
iter = 32 mu = -0.142857
iter = 33 mu = -0.4375
iter = 34 mu = -0.142857
iter = 35 mu = -0.4375
iter = 36 mu = -0.142857
iter = 37 mu = -0.4375
iter = 38 mu = -0.142857
iter = 39 mu = -0.4375
iter = 40 mu = -0.142857
iter = 41 mu = -0.4375
iter = 42 mu = -0.142857
iter = 43 mu = -0.4375
iter = 44 mu = -0.142857
iter = 45 mu = -0.4375
iter = 46 mu = -0.142857
iter = 47 mu = -0.4375
iter = 48 mu = -0.142857
iter = 49 mu = -0.4375
iter = 50 mu = -0.142857
Max iterations exceeded.

==========
==========
Running case p287 with alpha = 2
==========
==========

Original Matrix

```
 5.00  0.00  0.00  0.00       |     1.00
 0.00  5.00  0.00  0.00       |     3.00
 1.00  4.00 -3.00  0.00       |     4.00
-1.00 -2.00  0.00 -3.00       |     2.00
```

A-alphaI

```
 3.00  0.00  0.00  0.00       |     1.00
 0.00  3.00  0.00  0.00       |     3.00
 1.00  4.00 -5.00  0.00       |     4.00
-1.00 -2.00  0.00 -5.00       |     2.00
```

** Echelon Form **

```
 3.00  0.00  0.00  0.00       |     1.00
 0.00  3.00  0.00  0.00       |     3.00
 0.00  0.00 -5.00  0.00       |    -0.33
 0.00  0.00  0.00 -5.00       |     4.33
```

** L **

```
 1.00  0.00  0.00  0.00       |     1.00
 0.00  1.00  0.00  0.00       |     3.00
 0.33  1.33  1.00  0.00       |    -0.33
-0.33 -0.67  0.00  1.00       |     4.33
```

** LU Check **

```
 3.00  0.00  0.00  0.00       |     1.00
 0.00  3.00  0.00  0.00       |     3.00
 1.00  4.00 -5.00  0.00       |    -0.33
-1.00 -2.00  0.00 -5.00       |     4.33
```

iter = 1 mu = -0.4
iter = 2 mu = -0.277778
iter = 3 mu = 0.333333
iter = 4 mu = 0.333333
p287: Inverse Power Method Converged in 4 iterations.
p287: ========== Results
p287: mu = 0.333333
p287: lambda = 5
p287: ==========
p287: E-vector Check: x[0] = 1.00 Ax[0] = 5.00 ratio = 0.20

p287: E-vector Check: x[1] = 1.00 Ax[1] = 5.00 ratio = 0.20
p287: E-vector Check: x[2] = 0.67 Ax[2] = 2.98 ratio = 0.23
p287: E-vector Check: x[3] = -0.20 Ax[3] = -2.41 ratio = 0.08

==========
==========
Running case p287 with alpha = 3
==========
==========

Original Matrix

```
 5.00  0.00  0.00  0.00       |     1.00
 0.00  5.00  0.00  0.00       |     3.00
 1.00  4.00 -3.00  0.00       |     4.00
-1.00 -2.00  0.00 -3.00       |     2.00
```

A-alphaI

```
 2.00  0.00  0.00  0.00       |     1.00
 0.00  2.00  0.00  0.00       |     3.00
 1.00  4.00 -6.00  0.00       |     4.00
-1.00 -2.00  0.00 -6.00       |     2.00
```

** Echelon Form **

```
 2.00  0.00  0.00  0.00       |     1.00
 0.00  2.00  0.00  0.00       |     3.00
 0.00  0.00 -6.00  0.00       |    -2.50
 0.00  0.00  0.00 -6.00       |     5.50
```

```
-------------------------------------
** L **
-------------------------------------

 1.00  0.00  0.00  0.00       |     1.00
 0.00  1.00  0.00  0.00       |     3.00
 0.50  2.00  1.00  0.00       |    -2.50
-0.50 -1.00  0.00  1.00       |     5.50

-------------------------------------
** LU Check **
-------------------------------------

 2.00  0.00  0.00  0.00       |     1.00
 0.00  2.00  0.00  0.00       |     3.00
 1.00  4.00 -6.00  0.00       |    -2.50
-1.00 -2.00  0.00 -6.00       |     5.50
iter = 1 mu = 0.5
iter = 2 mu = 0.5
p287: Inverse Power Method Converged in 2 iterations.
p287: ============================ Results
p287: mu = 0.5
p287: lambda = 5
p287: ============================
p287: E-vector Check:     x[0] =  1.00     Ax[0] =  5.00     ratio =  0.20
p287: E-vector Check:     x[1] =  1.00     Ax[1] =  5.00     ratio =  0.20
p287: E-vector Check:     x[2] =  0.67     Ax[2] =  3.00     ratio =  0.22
p287: E-vector Check:     x[3] = -0.22     Ax[3] = -2.33     ratio =  0.10
```

==========
==========
Running case p287 with alpha = 4
==========
==========

```
-------------------------------------
```

Original Matrix

```
 5.00  0.00  0.00  0.00       |     1.00
 0.00  5.00  0.00  0.00       |     3.00
 1.00  4.00 -3.00  0.00       |     4.00
-1.00 -2.00  0.00 -3.00       |     2.00
```

A-alphaI

```
 1.00  0.00  0.00  0.00       |     1.00
 0.00  1.00  0.00  0.00       |     3.00
 1.00  4.00 -7.00  0.00       |     4.00
-1.00 -2.00  0.00 -7.00       |     2.00
```

** Echelon Form **

```
 1.00  0.00  0.00  0.00       |     1.00
 0.00  1.00  0.00  0.00       |     3.00
 0.00  0.00 -7.00  0.00       |    -9.00
 0.00  0.00  0.00 -7.00       |     9.00
```

** L **

```
 1.00  0.00  0.00  0.00       |     1.00
 0.00  1.00  0.00  0.00       |     3.00
 1.00  4.00  1.00  0.00       |    -9.00
-1.00 -2.00  0.00  1.00       |     9.00
```

** LU Check **

```
 1.00  0.00  0.00  0.00       |     1.00
 0.00  1.00  0.00  0.00       |     3.00
 1.00  4.00 -7.00  0.00       |    -9.00
-1.00 -2.00  0.00 -7.00       |     9.00
```

iter = 1 mu = 1

```
iter = 2 mu = 1
p287: Inverse Power Method Converged in 2 iterations.
p287: ============================ Results
p287: mu = 1
p287: lambda = 5
p287: ============================
p287: E-vector Check:     x[0] =  1.00     Ax[0] =  5.00     ratio =  0.20
p287: E-vector Check:     x[1] =  1.00     Ax[1] =  5.00     ratio =  0.20
p287: E-vector Check:     x[2] =  0.63     Ax[2] =  3.10     ratio =  0.20
p287: E-vector Check:     x[3] = -0.35     Ax[3] = -1.96     ratio =  0.18
```

==========
==========
Running case p287 with alpha = 4.9
==========
==========

```
------------------------------------
Original Matrix
------------------------------------

 5.00  0.00  0.00  0.00       |     1.00
 0.00  5.00  0.00  0.00       |     3.00
 1.00  4.00 -3.00  0.00       |     4.00
-1.00 -2.00  0.00 -3.00       |     2.00

------------------------------------
A-alphaI
------------------------------------

 0.10  0.00  0.00  0.00       |     1.00
 0.00  0.10  0.00  0.00       |     3.00
 1.00  4.00 -7.90  0.00       |     4.00
-1.00 -2.00  0.00 -7.90       |     2.00

------------------------------------
** Echelon Form **
------------------------------------
```

```
 0.10  0.00  0.00  0.00       |     1.00
 0.00  0.10  0.00  0.00       |     3.00
 0.00  0.00 -7.90  0.00       |    -126.00
 0.00  0.00  0.00 -7.90       |    72.00

-------------------------------------
** L **
-------------------------------------

 1.00  0.00  0.00  0.00       |     1.00
 0.00  1.00  0.00  0.00       |     3.00
10.00 40.00  1.00  0.00       |    -126.00
-10.00 -20.00  0.00  1.00       |    72.00

-------------------------------------
** LU Check **
-------------------------------------

 0.10  0.00  0.00  0.00       |     1.00
 0.00  0.10  0.00  0.00       |     3.00
 1.00  4.00 -7.90  0.00       |    -126.00
-1.00 -2.00  0.00 -7.90       |    72.00
iter = 1 mu = 10
iter = 2 mu = 10
p287: Inverse Power Method Converged in 2 iterations.
p287: ============================ Results
p287: mu = 10
p287: lambda = 5
p287: ============================
p287: E-vector Check:     x[0] =  1.00     Ax[0] =  5.00     ratio =  0.20
p287: E-vector Check:     x[1] =  1.00     Ax[1] =  5.00     ratio =  0.20
p287: E-vector Check:     x[2] =  0.63     Ax[2] =  3.12     ratio =  0.20
p287: E-vector Check:     x[3] = -0.37     Ax[3] = -1.88     ratio =  0.20
```

==========
==========
Running case p287 with alpha = -4
==========
==========

Original Matrix

```
 5.00  0.00  0.00  0.00       |     1.00
 0.00  5.00  0.00  0.00       |     3.00
 1.00  4.00 -3.00  0.00       |     4.00
-1.00 -2.00  0.00 -3.00       |     2.00
```

A-alphaI

```
 9.00  0.00  0.00  0.00       |     1.00
 0.00  9.00  0.00  0.00       |     3.00
 1.00  4.00  1.00  0.00       |     4.00
-1.00 -2.00  0.00  1.00       |     2.00
```

** Echelon Form **

```
 9.00  0.00  0.00  0.00       |     1.00
 0.00  9.00  0.00  0.00       |     3.00
 0.00  0.00  1.00  0.00       |     2.56
 0.00  0.00  0.00  1.00       |     2.78
```

** L **

```
 1.00  0.00  0.00  0.00       |     1.00
 0.00  1.00  0.00  0.00       |     3.00
 0.11  0.44  1.00  0.00       |     2.56
```

```
-0.11 -0.22  0.00  1.00       |     2.78

-------------------------------------
** LU Check **
-------------------------------------

 9.00  0.00  0.00  0.00       |     1.00
 0.00  9.00  0.00  0.00       |     3.00
 1.00  4.00  1.00  0.00       |     2.56
-1.00 -2.00  0.00  1.00       |     2.78
iter = 1 mu = 1.33333
iter = 2 mu = 1.02778
iter = 3 mu = 1.003
iter = 4 mu = 1.00033
iter = 5 mu = 1.00004
iter = 6 mu = 1
iter = 7 mu = 1
iter = 8 mu = 1
iter = 9 mu = 1
iter = 10 mu = 1
p287: Inverse Power Method Converged in 10 iterations.
p287: ============================ Results
p287: mu = 1
p287: lambda = -3
p287: ============================
p287: E-vector Check:     x[0] =  0.00     Ax[0] =  0.00     ratio =  0.20
p287: E-vector Check:     x[1] =  0.00     Ax[1] =  0.00     ratio =  0.20
p287: E-vector Check:     x[2] =  0.27     Ax[2] = -0.82     ratio = -0.33
p287: E-vector Check:     x[3] =  1.00     Ax[3] = -3.00     ratio = -0.33
```

==========
==========
Running case p285 with alpha = 2
==========
==========

Original Matrix

```
 1.00  3.00  3.00       |     1.00
-3.00 -5.00 -3.00       |     4.00
 3.00  3.00  1.00       |     4.00
```

A-alphaI

```
-1.00  3.00  3.00       |     1.00
-3.00 -7.00 -3.00       |     4.00
 3.00  3.00 -1.00       |     4.00
```

** Echelon Form **

```
-1.00  3.00  3.00       |     1.00
 0.00 -16.00 -12.00       |     1.00
 0.00  0.00 -1.00       |     7.75
```

** L **

```
 1.00  0.00  0.00       |     1.00
 3.00  1.00  0.00       |     1.00
-3.00 -0.75  1.00       |     7.75
```

** LU Check **

```
-1.00  3.00  3.00       |     1.00
-3.00 -7.00 -3.00       |     1.00
 3.00  3.00 -1.00       |     7.75
```

iter = 1 mu = -2.5
iter = 2 mu = -1.15
iter = 3 mu = -1.03261

```
iter = 4 mu = -1.00789
iter = 5 mu = -1.00196
iter = 6 mu = -1.00049
iter = 7 mu = -1.00012
iter = 8 mu = -1.00003
iter = 9 mu = -1.00001
iter = 10 mu = -1
iter = 11 mu = -1
iter = 12 mu = -1
iter = 13 mu = -1
iter = 14 mu = -1
iter = 15 mu = -1
p285: Inverse Power Method Converged in 15 iterations.
p285: ========================== Results
p285: mu = -1
p285: lambda = 1
p285: ==========================
p285: E-vector Check:     x[0] =  1.00     Ax[0] =  1.00     ratio =  1.00
p285: E-vector Check:     x[1] = -1.00     Ax[1] = -1.00     ratio =  1.00
p285: E-vector Check:     x[2] =  1.00     Ax[2] =  1.00     ratio =  1.00
```

==========
==========
Running case p270 with alpha = 1
==========
==========

```
-------------------------------------
Original Matrix
-------------------------------------

 4.00 -1.00  6.00       |     1.00
 2.00  1.00  6.00       |     4.00
 2.00 -1.00  8.00       |     4.00

-------------------------------------
A-alphaI
-------------------------------------
```

```
 3.00 -1.00  6.00       |     1.00
 2.00  0.00  6.00       |     4.00
 2.00 -1.00  7.00       |     4.00

-------------------------------------
** Echelon Form **
-------------------------------------

 3.00 -1.00  6.00       |     1.00
 0.00  0.67  2.00       |     3.33
 0.00  0.00  4.00       |     5.00

-------------------------------------
** L **
-------------------------------------

 1.00  0.00  0.00       |     1.00
 0.67  1.00  0.00       |     3.33
 0.67 -0.50  1.00       |     5.00

-------------------------------------
** LU Check **
-------------------------------------

 3.00 -1.00  6.00       |     1.00
 2.00  0.00  6.00       |     3.33
 2.00 -1.00  7.00       |     5.00
iter = 1 mu = 0.125
iter = 2 mu = 0.125
p270: Inverse Power Method Converged in 2 iterations.
p270: ============================ Results
p270: mu = 0.125
p270: lambda = 9
p270: ============================
p270: E-vector Check:     x[0] =  1.00     Ax[0] =  9.00     ratio =  0.11
p270: E-vector Check:     x[1] =  1.00     Ax[1] =  9.00     ratio =  0.11
p270: E-vector Check:     x[2] =  1.00     Ax[2] =  9.00     ratio =  0.11
```