exam02 - q03 - lyapunov equation

@author Bardia Mojra @date 11/13/2021 @title exam02 - lyapunov equation @class ee5323 - Nonlinear Systems @professor Dr. Frank Lewis

```
clc
clear
close all
%warning('off','all')
%warning

A = [0 1; -3 -4];

Q1 = [1 0; 0 1];
Q2 = [0 1; 1 0];
Q3 = [1 0; 0 0];
Q4 = [0 1; 0 0];
Q5 = [0 0; 1 0];
Q6 = [0 0; 0 1];

Q7 = [0 1; 1 1];
Q8 = [1 0; 1 1];
Q9 = [1 1; 0 1];
Q10 = [1 1; 1 0];

Q11 = [0 0; 1 1];
Q12 = [1 1; 0 0];
Q13 = [1 0; 0 1];
Q14 = [0 1; 1 0];

Q1
P = lyap(A,Q1)
m11 = P(1,1)
m22 = P(1,1)*P(2,2) - P(1,2)*P(2,1)

Q2
P = lyap(A,Q2)
m11 = P(1,1)
m22 = P(1,1)*P(2,2) - P(1,2)*P(2,1)

Q3
lyap(A,Q3)
m11 = P(1,1)
m22 = P(1,1)*P(2,2) - P(1,2)*P(2,1)

Q4
P = lyap(A,Q4)
m11 = P(1,1)
m22 = P(1,1)*P(2,2) - P(1,2)*P(2,1)

disp(Q5)
P = lyap(A,Q5)
```

```
m11 = P(1,1)
m22 = P(1,1)*P(2,2) - P(1,2)*P(2,1)

disp(Q6)
P = lyap(A,Q6)
m11 = P(1,1)
m22 = P(1,1)*P(2,2) - P(1,2)*P(2,1)

disp(Q7)
P = lyap(A,Q7)
m11 = P(1,1)
m22 = P(1,1)*P(2,2) - P(1,2)*P(2,1)

disp(Q8)
P = lyap(A,Q8)
m11 = P(1,1)
m22 = P(1,1)*P(2,2) - P(1,2)*P(2,1)

disp(Q9)
P = lyap(A,Q9)
m11 = P(1,1)
m22 = P(1,1)*P(2,2) - P(1,2)*P(2,1)

disp(Q10)
P = lyap(A,Q10)
m11 = P(1,1)
m22 = P(1,1)*P(2,2) - P(1,2)*P(2,1)

disp(Q11)
P = lyap(A,Q11)
m11 = P(1,1)
m22 = P(1,1)*P(2,2) - P(1,2)*P(2,1)

disp(Q12)
P = lyap(A,Q12)
m11 = P(1,1)
m22 = P(1,1)*P(2,2) - P(1,2)*P(2,1)

disp(Q13)
P = lyap(A,Q13)
m11 = P(1,1)
m22 = P(1,1)*P(2,2) - P(1,2)*P(2,1)

disp(Q14)
P = lyap(A,Q14)
m11 = P(1,1)
m22 = P(1,1)*P(2,2) - P(1,2)*P(2,1)


Q1 =

     1     0
     0     1
```

```
P =

    0.8333   -0.5000
   -0.5000    0.5000


m11 =

    0.8333


m22 =

    0.1667


Q2 =

     0     1
     1     0


P =

    0.3333         0
         0         0


m11 =

    0.3333


m22 =

     0


Q3 =

     1     0
     0     0


ans =

    0.7917   -0.5000
   -0.5000    0.3750


m11 =

    0.3333
```

```
m22 =

     0


Q4 =

     0     1
     0     0


P =

    0.1667    0.1250
   -0.1250    0.0000


m11 =

    0.1667


m22 =

    0.0156

     0     0
     1     0


P =

    0.1667   -0.1250
    0.1250         0


m11 =

    0.1667


m22 =

    0.0156

     0     0
     0     1


P =

    0.0417         0
```

```
         0    0.1250


m11 =

    0.0417


m22 =

    0.0052

     0     1
     1     1


P =

    0.3750   -0.0000
   -0.0000    0.1250


m11 =

    0.3750


m22 =

    0.0469

     1     0
     1     1


P =

    1.0000   -0.6250
   -0.3750    0.5000


m11 =

     1


m22 =

    0.2656

     1     1
     0     1
```

```
P =

    1.0000   -0.3750
   -0.6250    0.5000


m11 =

     1


m22 =

    0.2656

     1     1
     1     0


P =

    1.1250   -0.5000
   -0.5000    0.3750


m11 =

    1.1250


m22 =

    0.1719

     0     0
     1     1


P =

    0.2083   -0.1250
    0.1250    0.1250


m11 =

    0.2083


m22 =

    0.0417

     1     1
```

```
     0     0


P =

    0.9583   -0.3750
   -0.6250    0.3750


m11 =

    0.9583


m22 =

    0.1250

     1     0
     0     1


P =

    0.8333   -0.5000
   -0.5000    0.5000


m11 =

    0.8333


m22 =

    0.1667

     0     1
     1     0


P =

    0.3333         0
         0         0


m11 =

    0.3333


m22 =
```

```
0
```

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