Contents

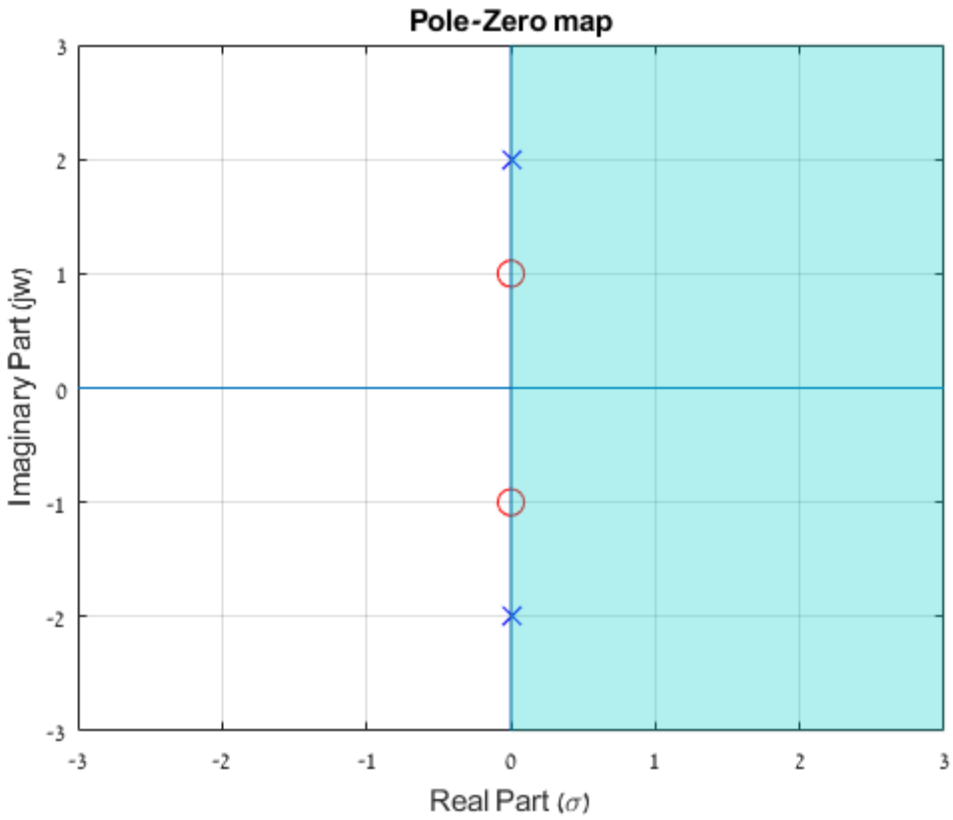
Students ID's

```
ID = 316098052;
disp(ID)
```

```
    316098052
```

1 Pole-Zero Plot

```
pzplot2([1 0 1],[1 0 4 ])
```



2 Solve the following problems

2.1

```
Y = [1 -1 6];
X = [0  1 1];
tf(X,Y)
step(tf(X,Y));
pzplot2(X,Y);
```

```
ans =

     s + 1
  -----------
  s^2 - s + 6

Continuous-time transfer function.
```

2.2

```
Y = [3 -2 6];
X = [2 1 -1];
tf(X,Y)
step(tf(X,Y));
pzplot2(X,Y);
```

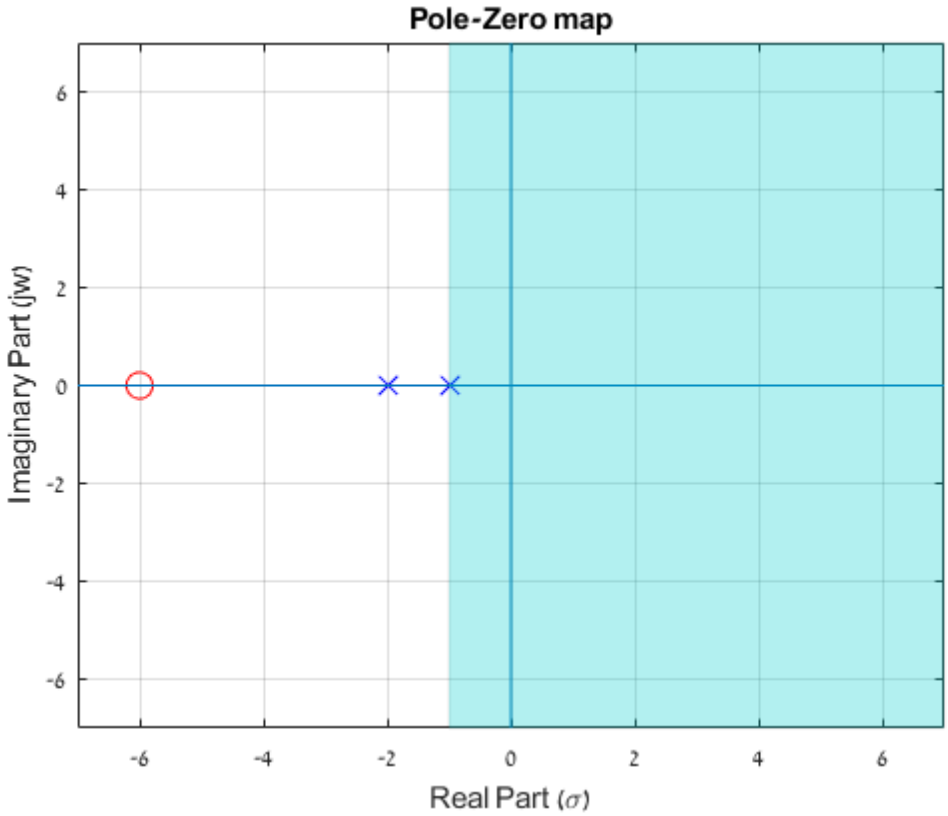
2.3

```
Y = [1 3 2];
X = [0 1 6];
tf(X,Y)
step(tf(X,Y));
pzplot2(X,Y);
```

```
ans =

      s + 6
  -------------
  s^2 + 3 s + 2

Continuous-time transfer function.
```



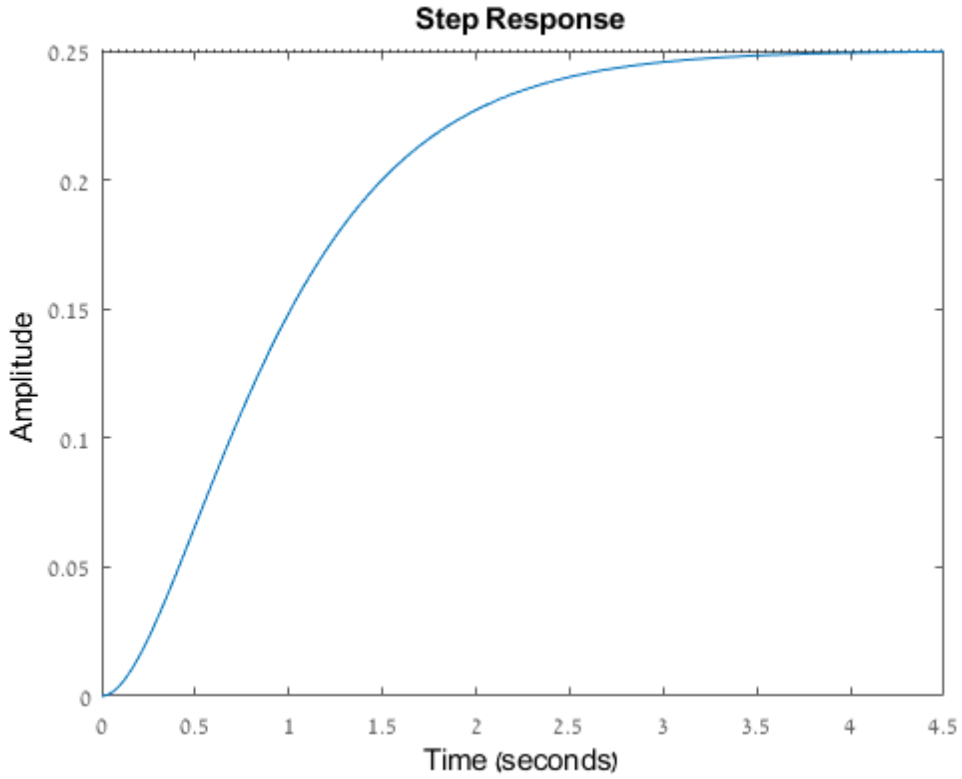
2.4

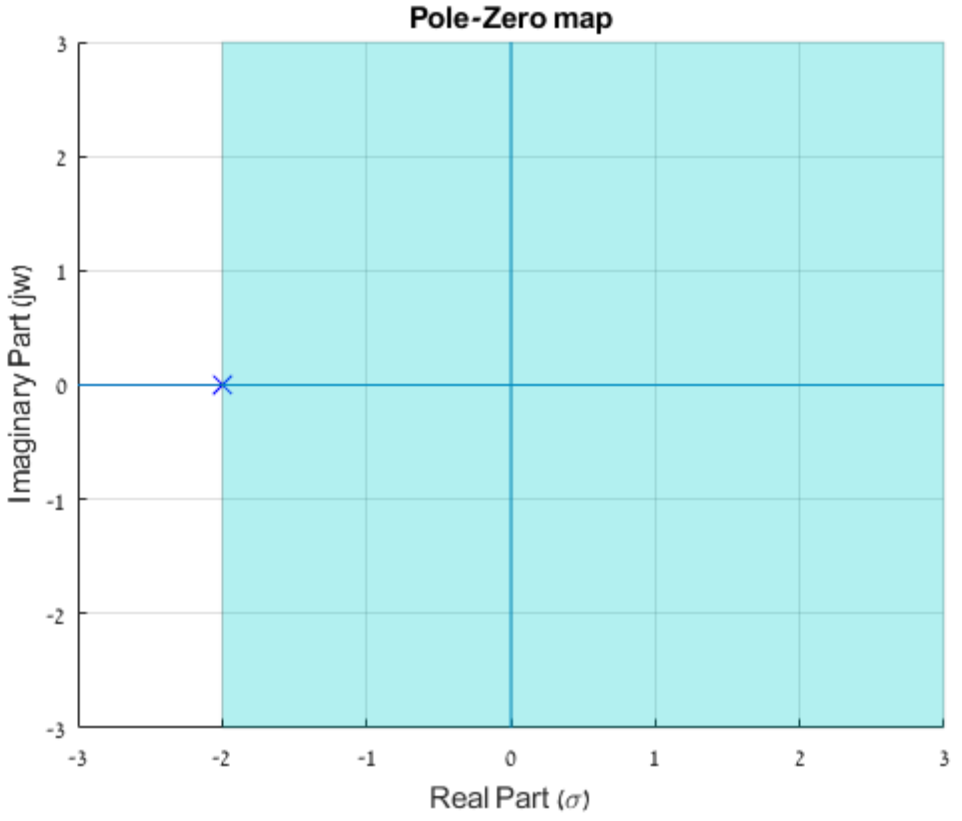
```
Y = [1 4 4];
X = [0 0 1];
tf(X,Y)
step(tf(X,Y));
pzplot2(X,Y);
```

```
ans =

        1
  -------------
  s^2 + 4 s + 4

Continuous-time transfer function.
```





5 First order system step response

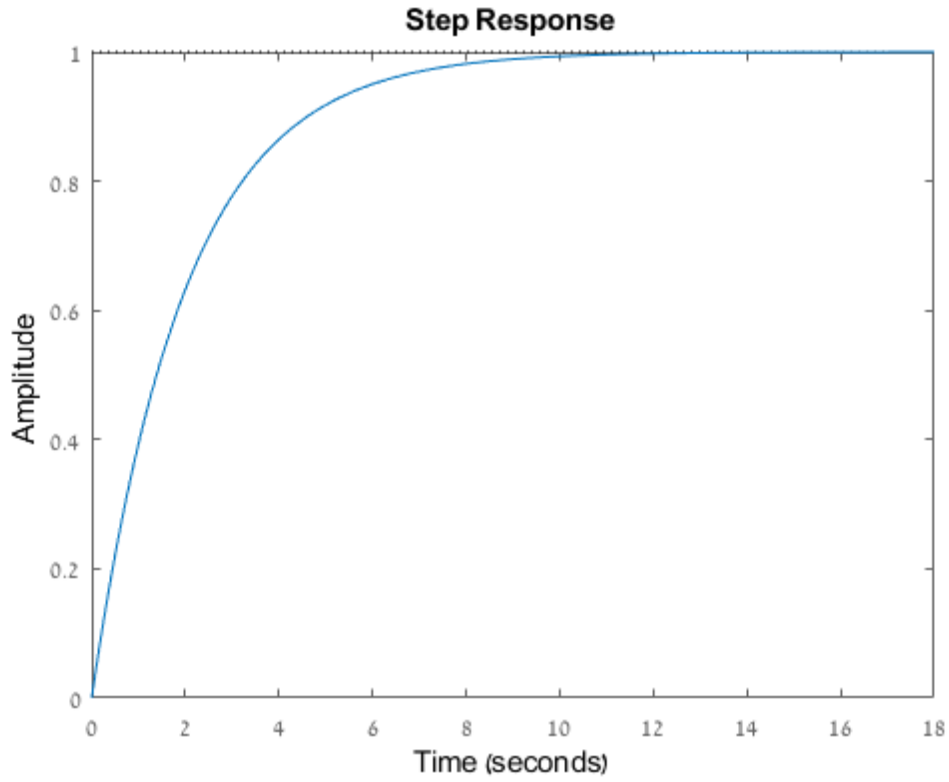
T = 2

```
Y = [0 2 1];
X = [0 0 1];
tf(X,Y)
step(tf(X,Y));
```

```
ans =

     1
  -------
  2 s + 1

Continuous-time transfer function.
```



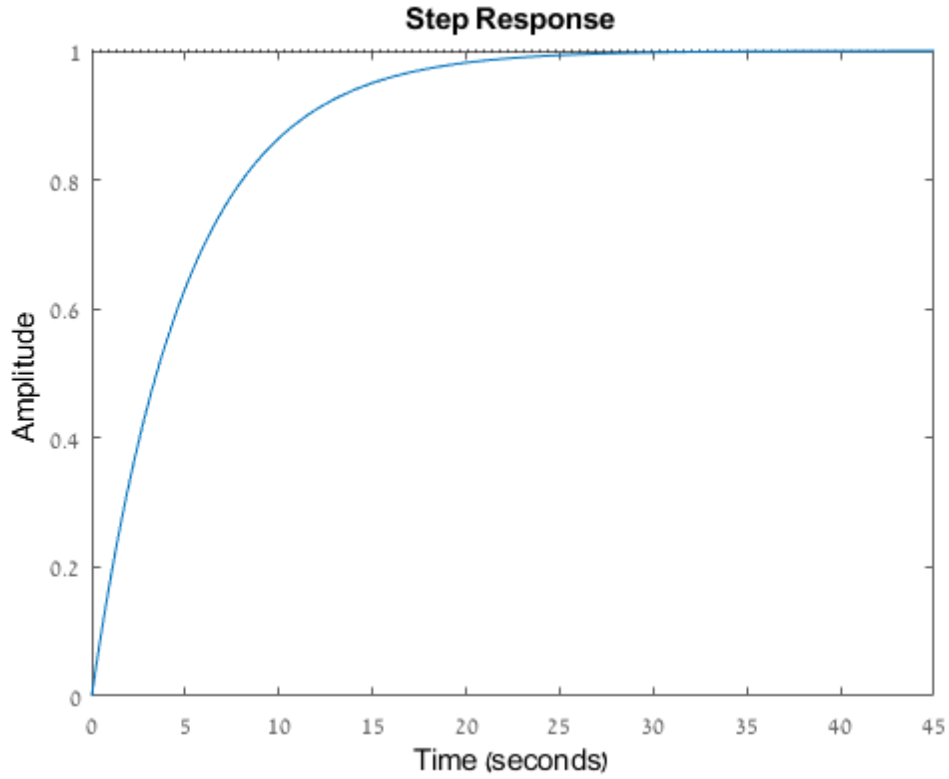
T = 5

```
Y = [0 5 1];
X = [0 0 1];
tf(X,Y)
step(tf(X,Y));
```

```
ans =

     1
  -------
  5 s + 1

Continuous-time transfer function.
```



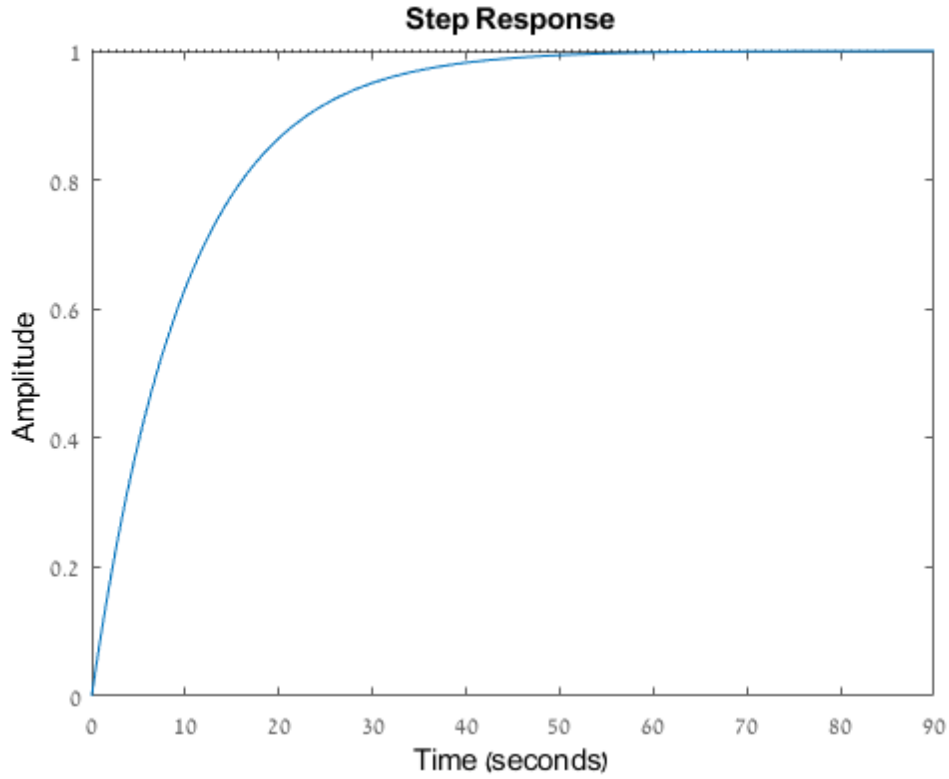
T = 10

```
Y = [0 10 1];
X = [0 0 1];
tf(X,Y)
step(tf(X,Y));
```

```
ans =

     1
  --------
  10 s + 1

Continuous-time transfer function.
```



The greater the coefficent of s, the slower the convergence of the function is.

6 A closed loop system

6.1

```
Y = [1 20 1000 5000];
X = [0 0 0 5000];
T = tf(X,Y);
T_Y = Y;
T_X = X;
tf(X,Y)
```

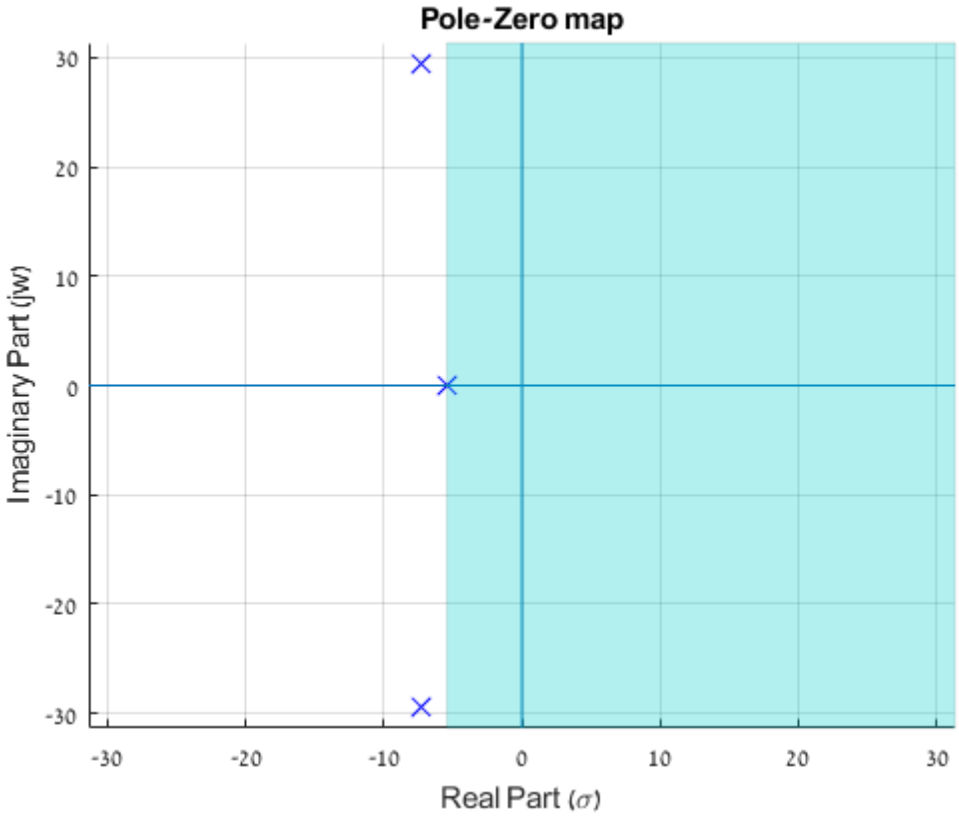
```
ans =

             5000
  ----------------------------
  s^3 + 20 s^2 + 1000 s + 5000

Continuous-time transfer function.
```

6.2

```
[zeros,poles] = pzplot2(X,Y);
zeros;
poles;
```



6.3

```
Y = [1 20 1000 5000 0];
X = [0 0 0 0 5000];
tf(X,Y)
[r,p,k] = residue(X,Y);
r;
p;
k;
```

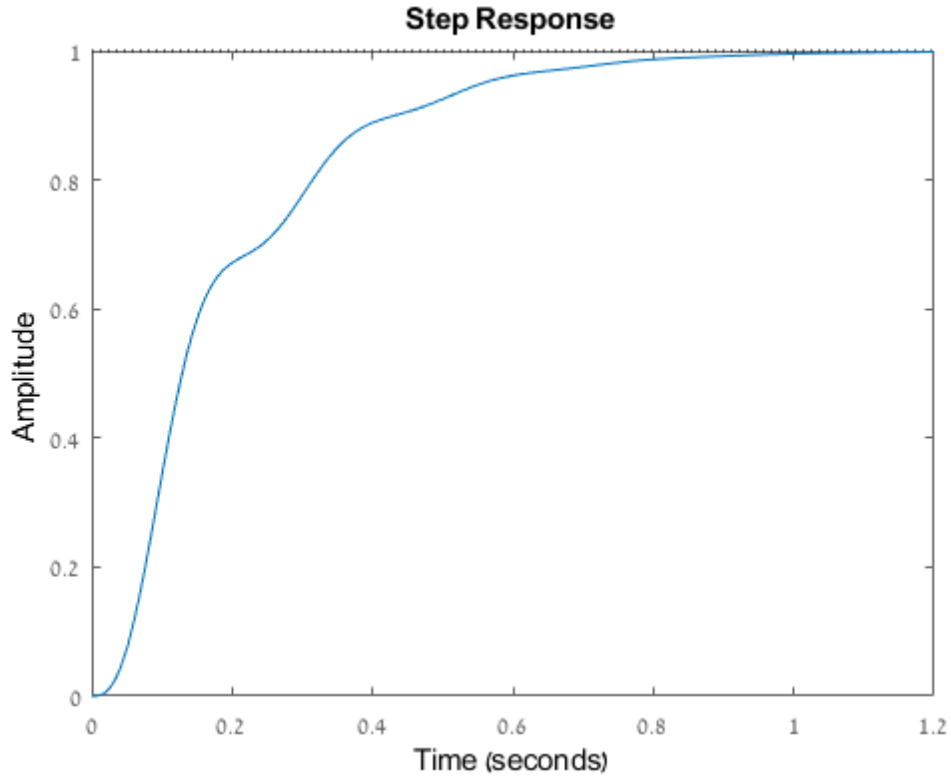
```
ans =

                5000
  --------------------------------
  s^4 + 20 s^3 + 1000 s^2 + 5000 s

Continuous-time transfer function.
```

6.4

```
step(T)
pzplot2(T_X,T_Y);
```




```
function [zeros,poles] = pzplot2(a,b)

    poles = complex(roots(b));
    max_pole = max(real(poles));
    zeros = complex(roots(a));
    axe = max([max(abs(zeros)) max(abs(poles))]);

    figure

    plot(zeros,'o','MarkerEdgeColor','red','MarkerSize',10)
    hold on
    plot(poles, 'x','MarkerEdgeColor','blue','MarkerSize',10)
    grid, axis([-axe-1 axe+1 -axe-1 axe+1])
    hold on
    xL = xlim;
    yL = ylim;
    line([0 0], yL);  %x-axis
    line(xL, [0 0]);  %y-axis
    hold on
    patch_x = [max_pole; max_pole; axe+1; axe+1];
    patch_y = [-axe-1; axe+1; axe+1; -axe-1];
    patch(patch_x,patch_y,[0,0.8,0.8],'edgeAlpha',0.1);
    alpha(0.3)
    hold off

    title('Pole-Zero map')
    xlabel('Real Part (\sigma)')
    ylabel('Imaginary Part (jw)')

end
```

```
ans =

   0.0000 + 1.0000i
```

```
0.0000 - 1.0000i
```

Published with MATLAB® R2019b