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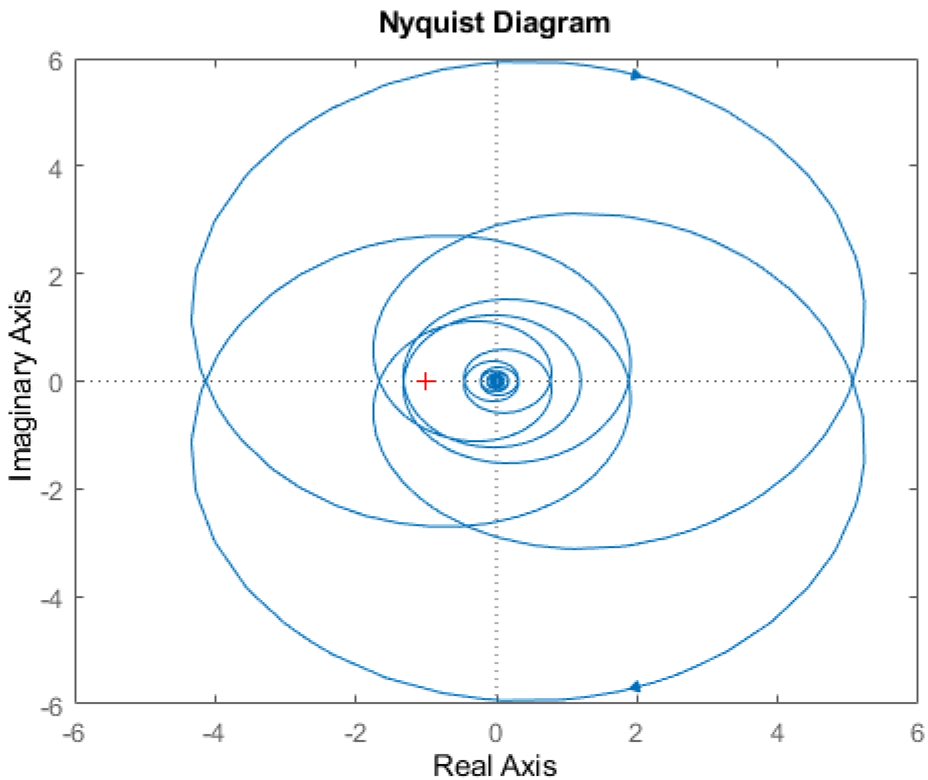
```
K = 1;
Hol = K * tf(30,[1 1 25],'IODelay',2)
w = logspace(-2,2,1e3);
nyquist(Hol)
% closed loop unstable for k = 1
```

```
Hol =
 
                    30
  exp(-2*s) * ------------
              s^2 + s + 25
 
Continuous-time transfer function.
```



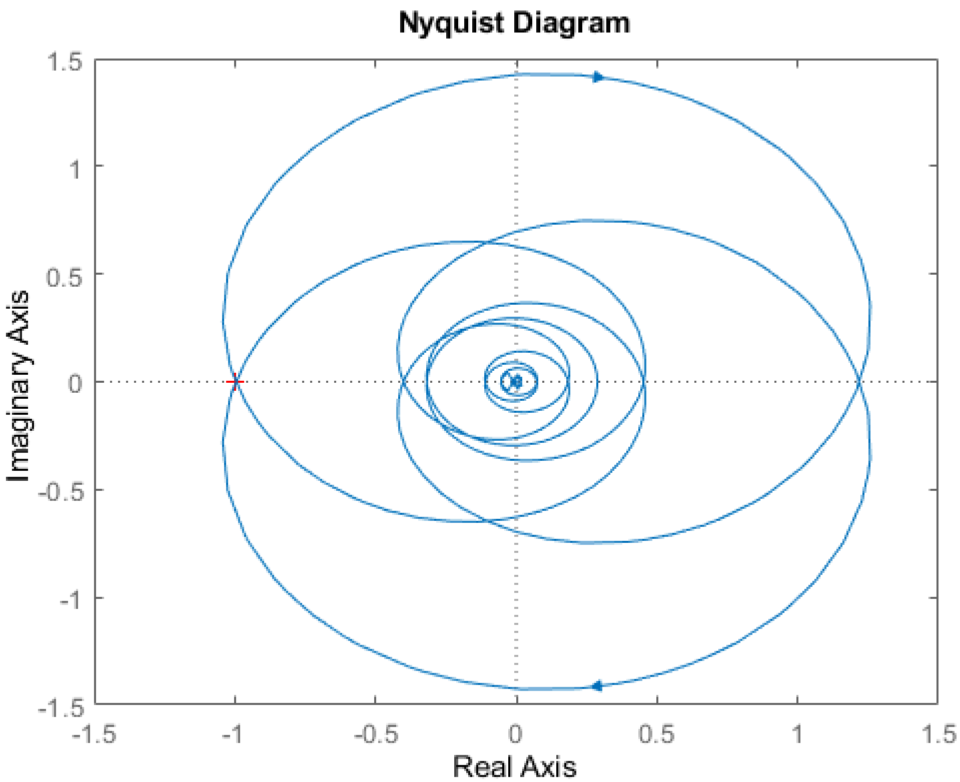

```
%Stable CL for k < 1/Re(H(jw)) adica -4.14
K = 1/4.16;
Hol = K * tf(30,[1 1 25],'IODelay',2)
w = logspace(-2,2,1e3);
nyquist(Hol)

%%Homework find all the k such that is stable in cl
```

```
Hol =

                 7.212
  exp(-2*s) * ------------
              s^2 + s + 25

Continuous-time transfer function.
```



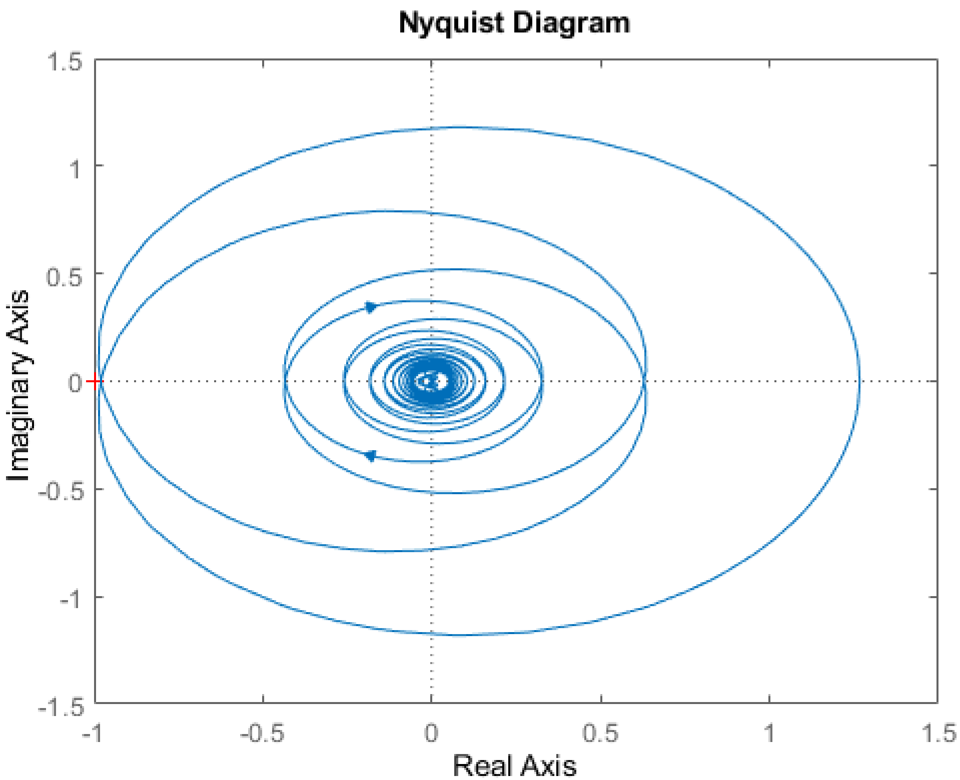
Exercise a

```
k = 0.38;
Hol = tf(k*10, [1 3],'IOdelay',1)
w = logspace(2,2,1e3);
nyquist(Hol)
% closed loop is stable for k < 1/abs(-2.58)
```

```
Hol =

                3.8
  exp(-1*s) * -----
              s + 3

Continuous-time transfer function.
```



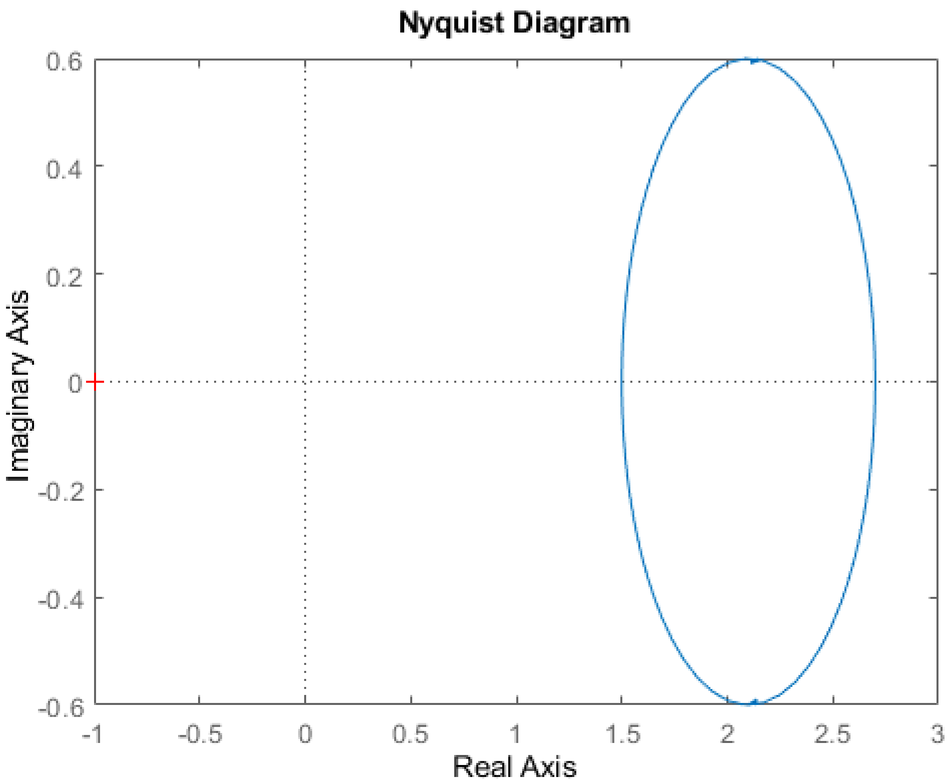
Exercise b

```
k = 1.5;
Hol = tf(k*[1 900], [1 500])
w = logspace(2,2,1e3);
nyquist(Hol)
% for k =1.5 the cl is stable
```

```
Hol =

  1.5 s + 1350
  ------------
    s + 500

Continuous-time transfer function.
```



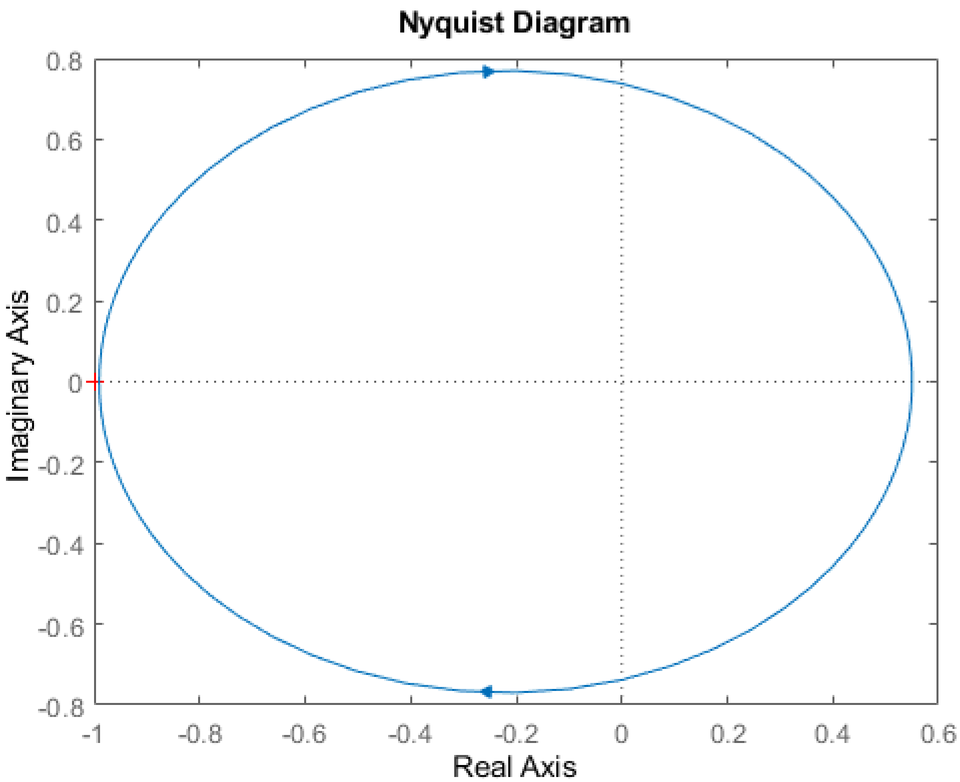
Exercise c

```
k = 0.55;
Hol = tf(k*[1 -9e6], [1 5e6])
w = logspace(2,2,1e3);
nyquist(Hol)
% CL stable for k < 1/abs(-1.8)
```

```
Hol =

  0.55 s - 4.95e06
  ----------------
      s + 5e06

Continuous-time transfer function.
```



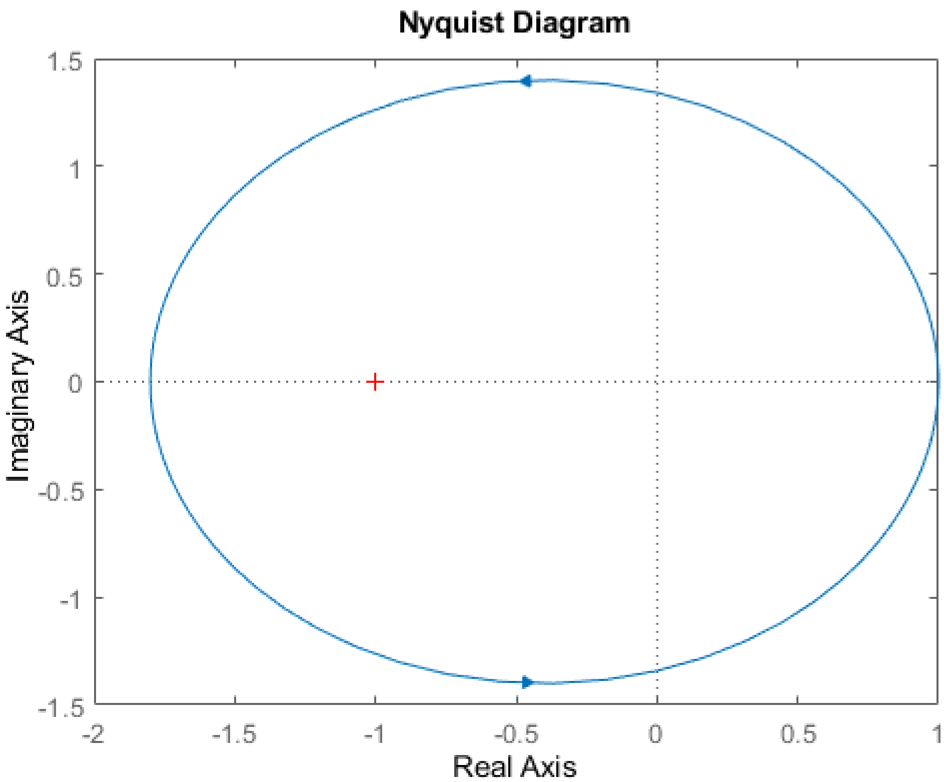
Exercise d

```
k = 1;
Hol = tf(k*[1 9], [1 -5])
w = logspace(2,2,1e3);
nyquist(Hol)
% for k from (5/9, infinity) CL stable
```

```
Hol =

  s + 9
  -----
  s - 5

Continuous-time transfer function.
```



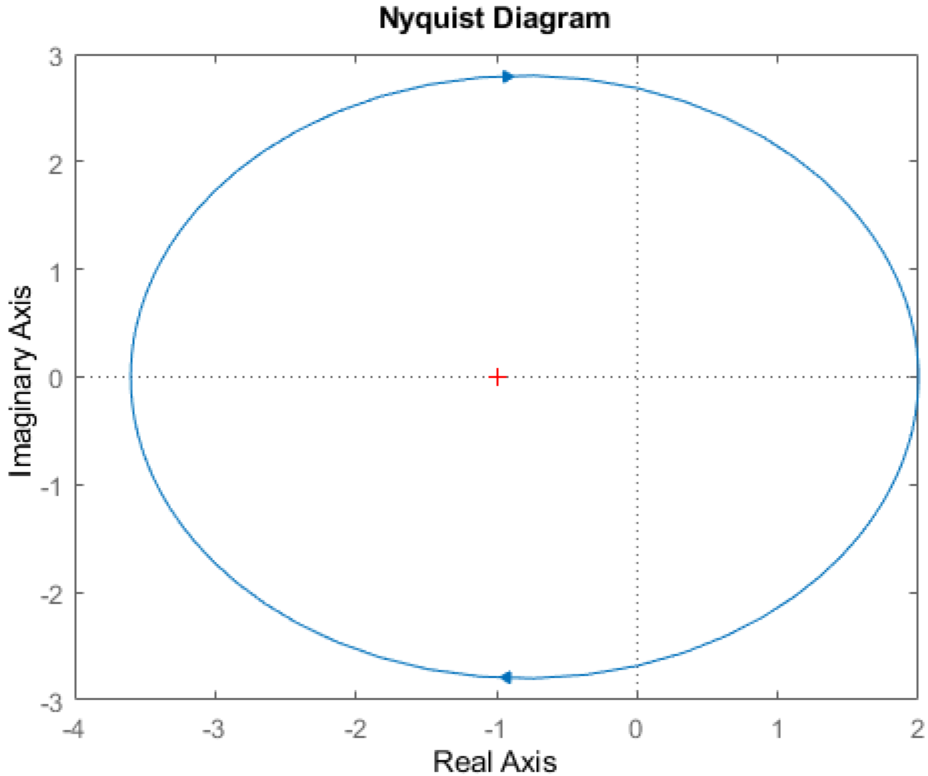
Exercise e

```
k = -2;
Hol = tf(k*[-1 9], [1 5])
w = logspace(2,2,1e3);
nyquist(Hol)
% CL stable for k = 1
```

```
Hol =

  2 s - 18
  --------
   s + 5

Continuous-time transfer function.
```



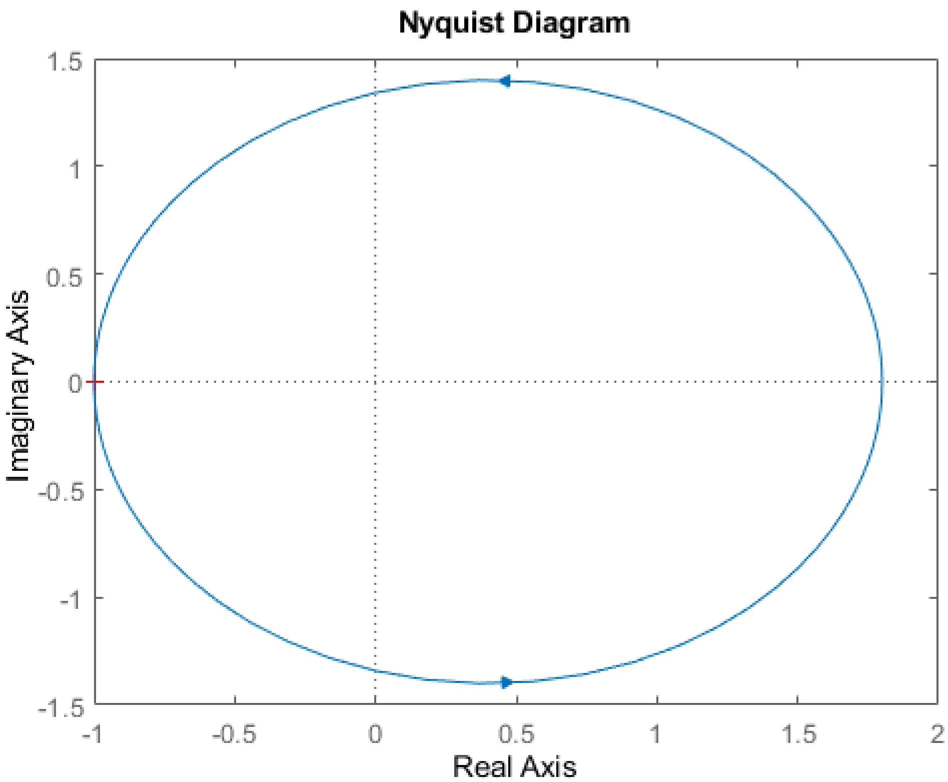
Exercise f

```
k = 1;
Hol = tf(k*[1 9], [-1 5])
w = logspace(2,2,1e3);
nyquist(Hol)
% CL stable for k = 1


Hol =

  -s - 9
  ------
  s - 5

Continuous-time transfer function.
```



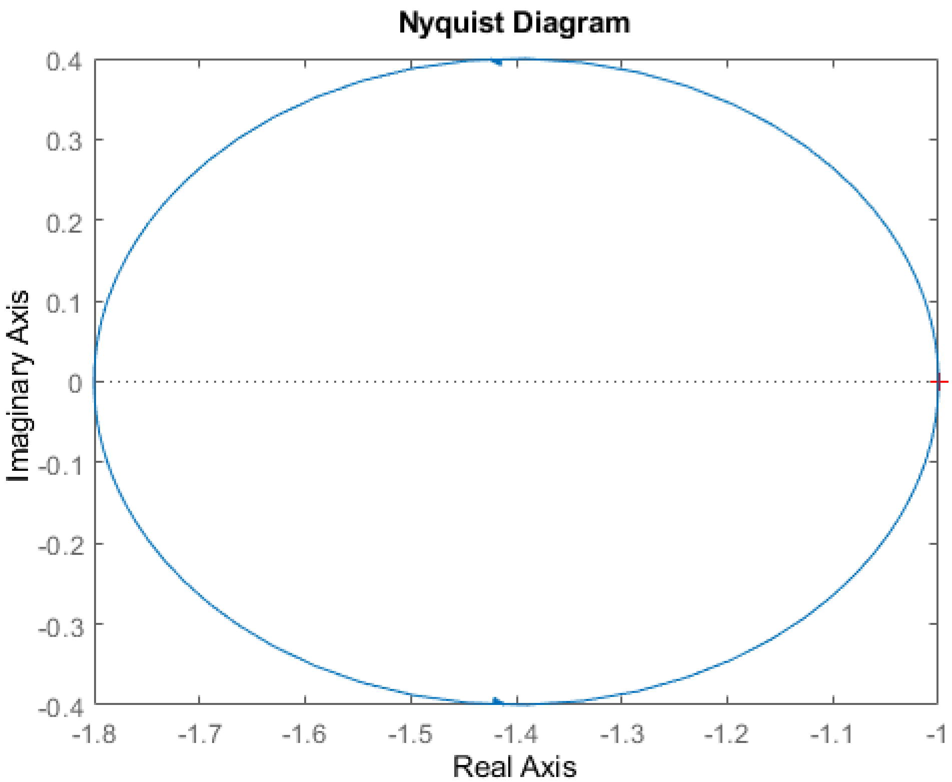
Exercise g

```
k = 1;
Hol = tf(k*[-1 9], [1 -5])
w = logspace(2,2,1e3);
nyquist(Hol)
% CL stable for k = 1;
```

```
Hol =

  -s + 9
  ------
  s - 5

Continuous-time transfer function.
```



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