

Allpass System Lecture

$$G(s) = \frac{1 - as}{1 + as}$$

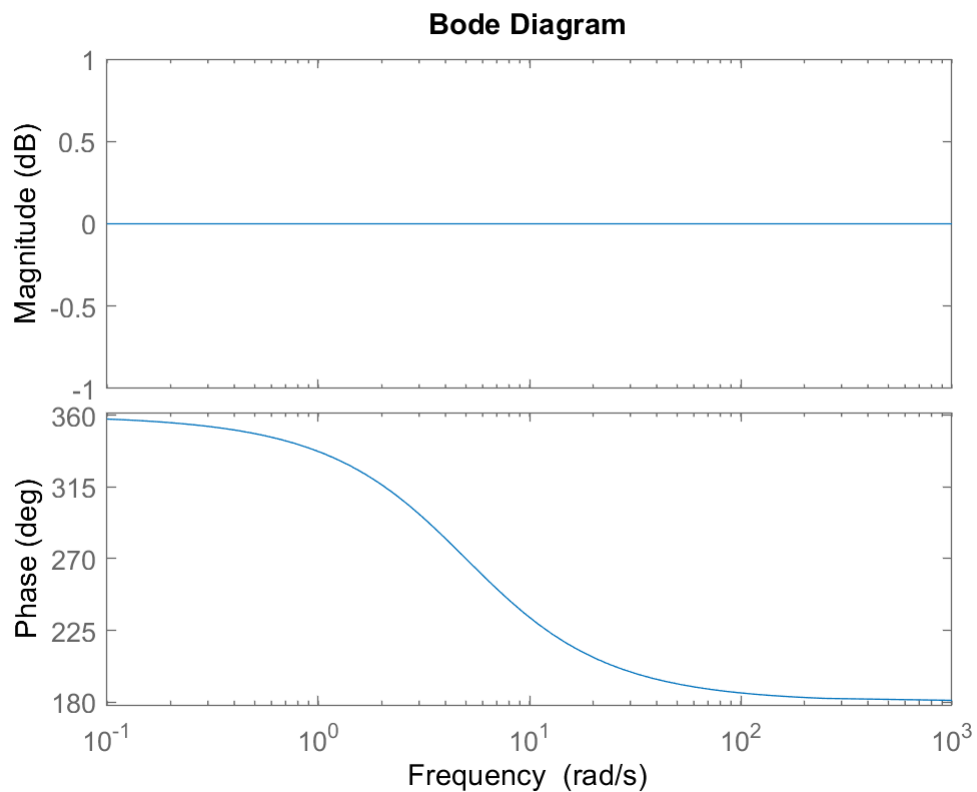
```
s = tf('s'); a = 1/5;  
G = (1 - a*s)/(1 + a*s)
```

G =

$$\frac{-0.2 s + 1}{0.2 s + 1}$$

Continuous-time transfer function.

```
figure, bode(G)
```



$$P = 1/(s + 1)$$

P =

$$\frac{1}{s + 1}$$

Continuous-time transfer function.

```
k = 1; C = k;  
Y = P*G*k
```

Y =

$$\frac{-0.2 s + 1}{0.2 s^2 + 1.2 s + 1}$$

Continuous-time transfer function.

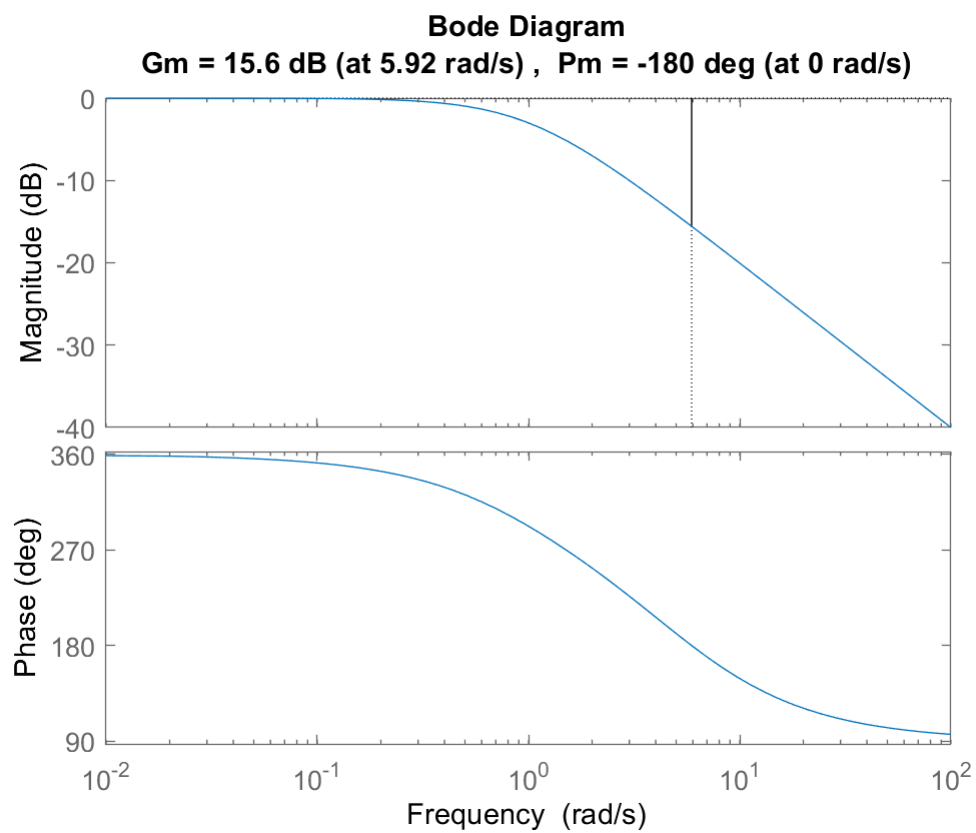
$$G = (-k/(s+1))*(s-1/a)/(s+1/a)$$

G =

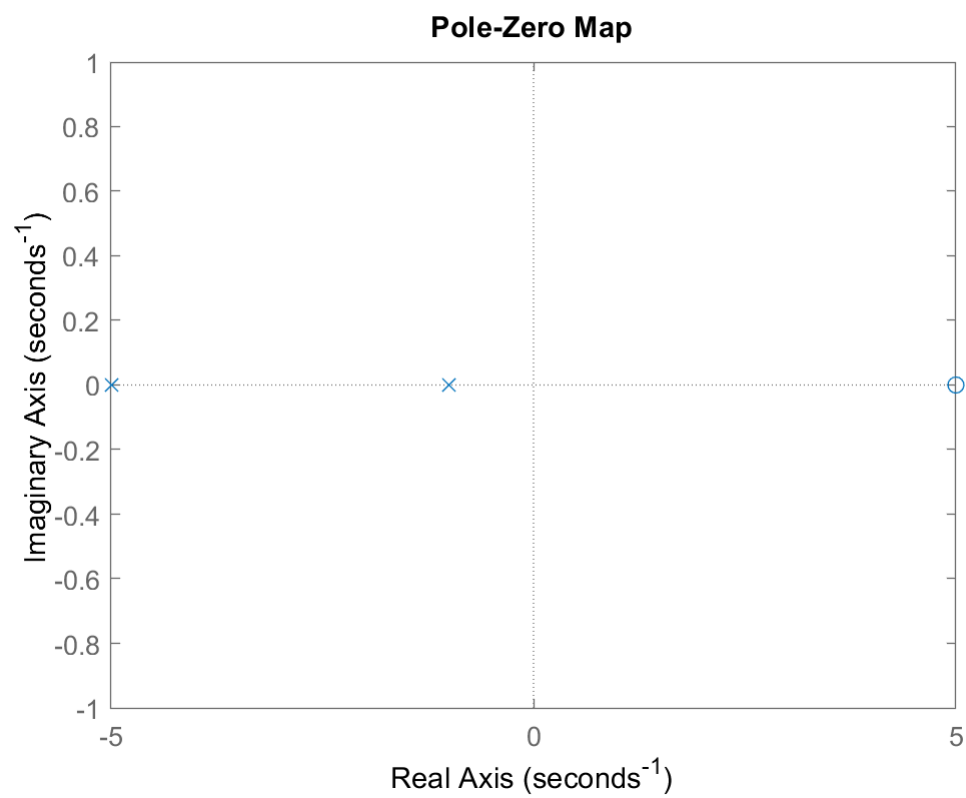
$$\frac{-s + 5}{s^2 + 6 s + 5}$$

Continuous-time transfer function.

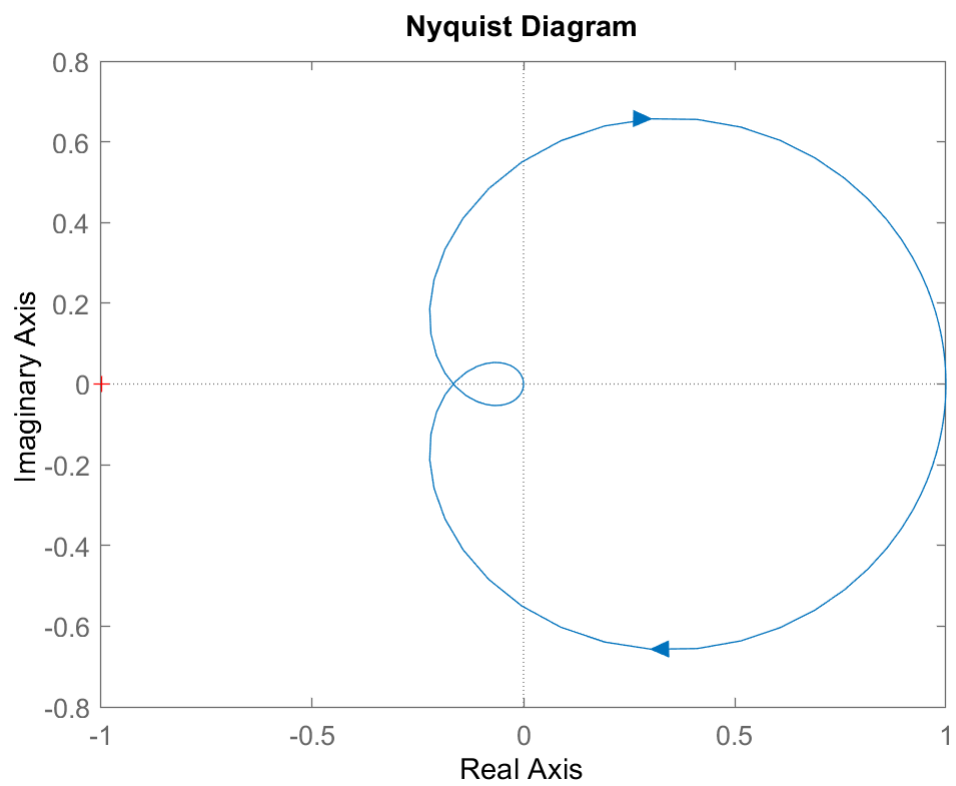
```
figure, bode(G), margin(G)
```



```
pzmap(G)
```

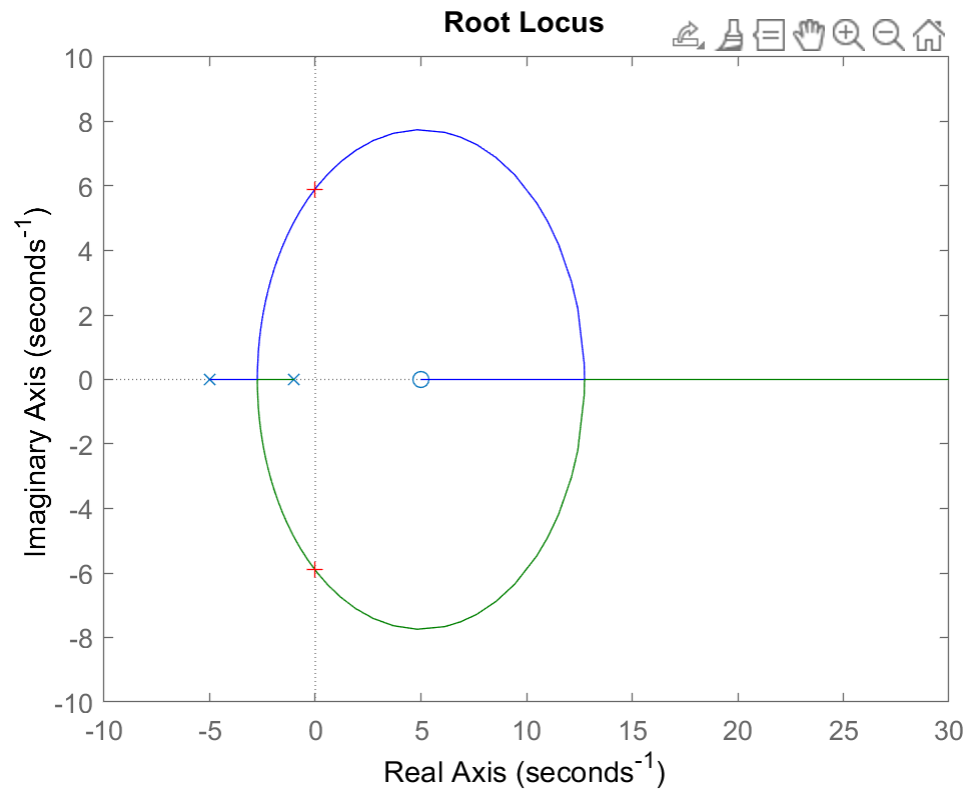


```
nyquist(G)
```



```
rlocus(G)
[k,poles] = rlocfind(G)
```

Select a point in the graphics window



```
selected_point = 0.0237 + 5.8605i
k = 5.9730
poles = 2x1 complex
-0.0135 + 5.9046i
-0.0135 - 5.9046i
```

Thus, k is about 6 so our range can only be within

$$0 < k < 6$$