ROOT LOCUS:

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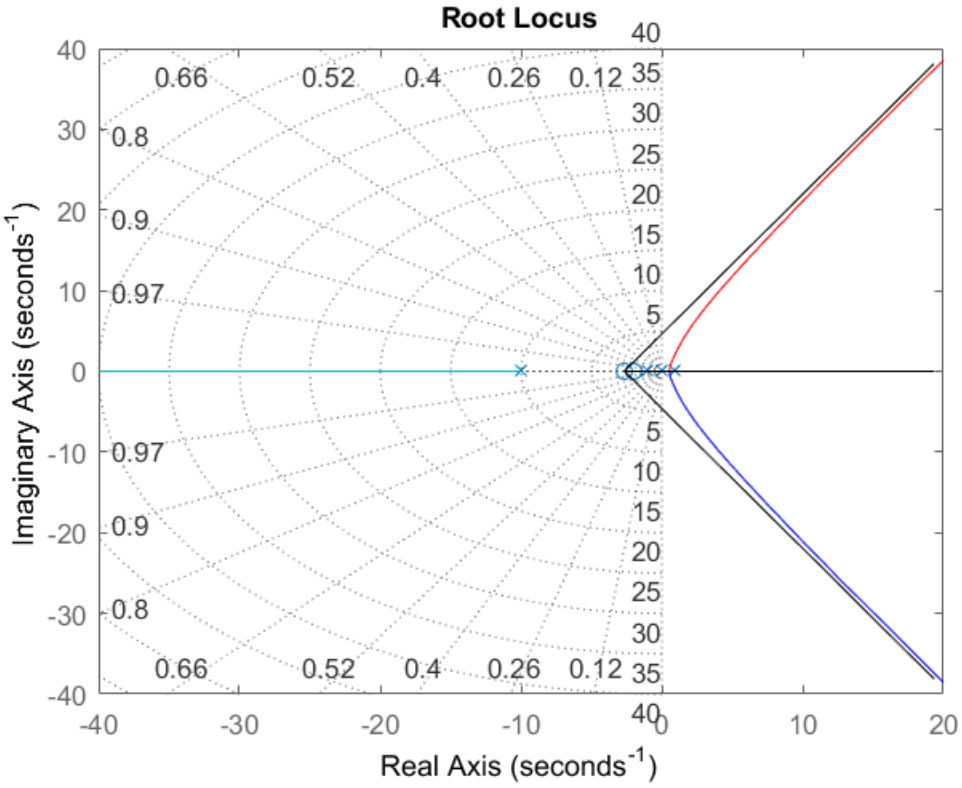
Positive Root Locus:

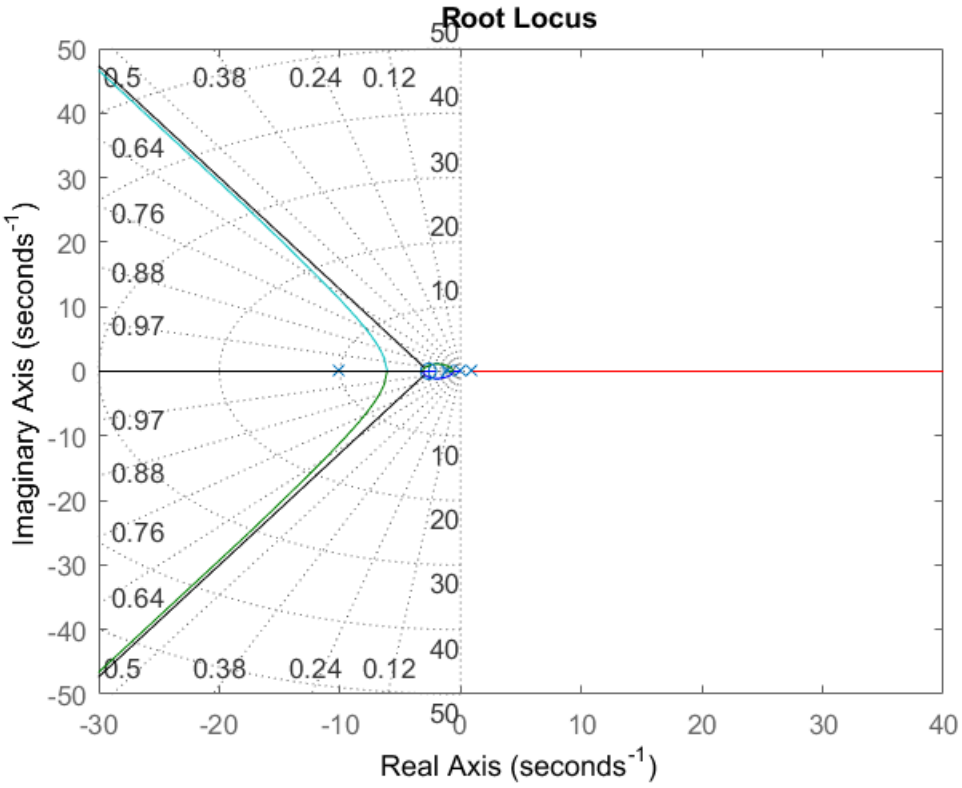
```
clc; clear all; close all;
s = tf('s');
G = (s+2)/(s*(s+10)*(s^2-1));
% Asymptots:
P = pole(G);
Z = zero(G);
m = length(P);
n = length(Z);
centroid = (sum(P)-sum(Z))/(m-n);
for i=1:m-n
    phi(i) = (2*(i-1)+1)*180/(m-n);
end
x = centroid:20;
m1 = tand(phi(1));
m2 = tand(phi(2));
m3 = tand(phi(3));
y1 = m1*(x-centroid);
y2 = m2*(x-centroid);
y3 = m3*(x-centroid);
figure(1);
rlocus(G);
hold on;
plot(centroid,0,'o');
hold on;
plot(x,y1,'k-');
hold on;
plot(x,y2,'k-');
hold on;
plot(x,y3,'k-');
hold off;
grid on;
```



Negative Root Locus:

```
s = tf('s');
G = -(s+2)/(s*(s+10)*(s^2-1));
% Asymptots:
P = pole(G);
Z = zero(G);
m = length(P);
n = length(Z);
centroid = (sum(P)-sum(Z))/(m-n);
for i=1:m-n
    phi(i) = (2*(i-1))*180/(m-n);
end
x = -30:centroid;
m1 = tand(phi(1));
m2 = tand(phi(2));
m3 = tand(phi(3));
y1 = m1*(x-centroid);
y2 = m2*(x-centroid);
y3 = m3*(x-centroid);
figure(2);
rlocus(G);
hold on;
plot(centroid,0,'o');
hold on;
```

```
plot(x,y1,'k-');
hold on;
plot(x,y2,'k-');
hold on;
plot(x,y3,'k-');
hold off;
grid on;
```



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