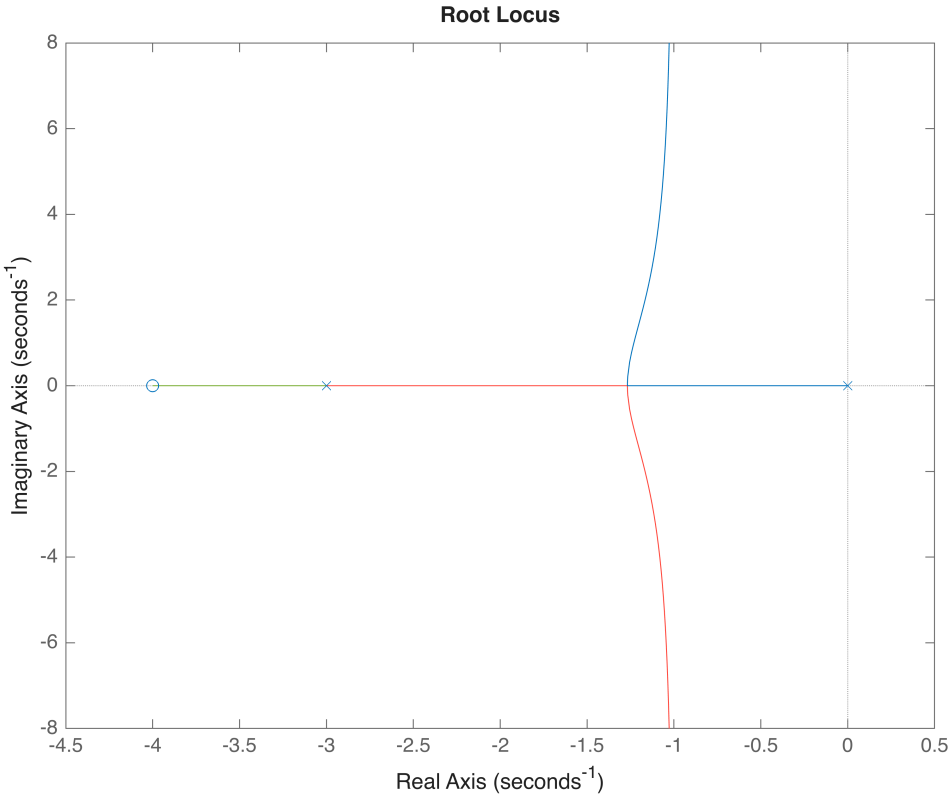
## problem 1

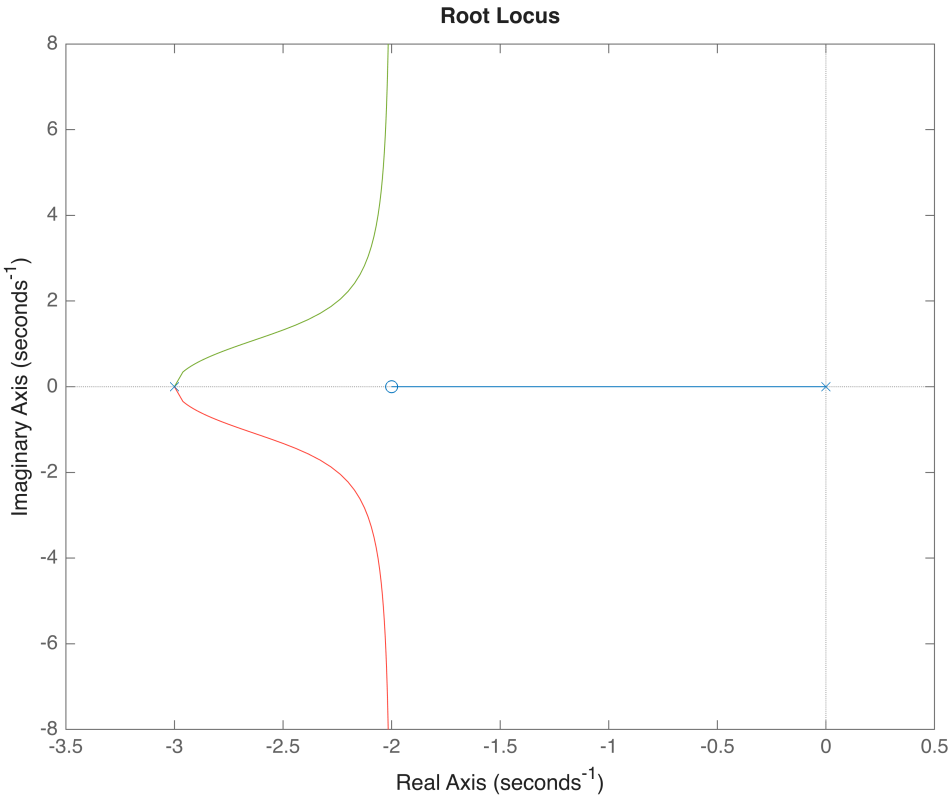
```
% givens
s  = zpk('s');
G = 6/(s+3)^2;

% display
G
```

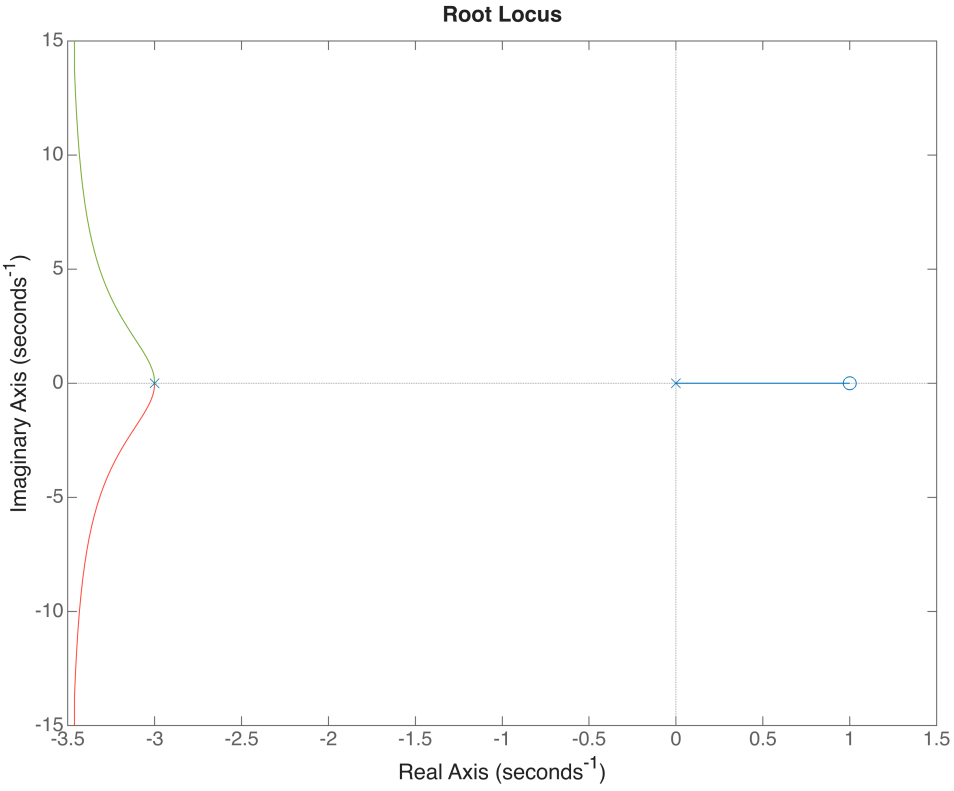
```
G =

     6
  -------
  (s+3)^2

Continuous-time zero/pole/gain model.
Model Properties
```

## part a

```
z = [-4, -2, 1];
for i=1:length(z)
        H0 = (s-z(i))/s;
        L0 = H0*G;
        fig = figure;
        rlocusplot(L0);
        saveas(fig, string('./images/s01a' + string(i) + '.png'));
end
```




Root Locus
Imaginary Axis (seconds-1)
Real Axis (seconds-1)
8
6
4
2
0
-2
-4
-6
-8
-3.5
-3
-2.5
-2
-1.5
-1
-0.5
0
0.5


Root Locus
Imaginary Axis (seconds-1)
Real Axis (seconds-1)
15
10
5
0
-5
-10
-15
-3.5
-3
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5

**part d**

```
zeta = 1/sqrt(2);
z = 3;
wn = 3/(2*zeta);
K  = wn^2/6;
Kp = K;
Ki = K*z;
H  = pid(Kp, Ki);
T  = feedback(G*H,1);

Kp, Ki, H, T
```

```
Kp =
0.7500
Ki =
2.2500
H =

             1
  Kp + Ki * ---
             s

  with Kp = 0.75, Ki = 2.25

Continuous-time PI controller in parallel form.
Model Properties

T =

       4.5 (s+3)
  ----------------------
  (s+3) (s^2 + 3s + 4.5)

Continuous-time zero/pole/gain model.
Model Properties
```