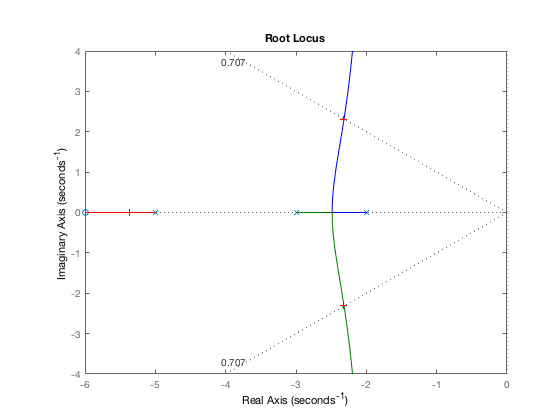
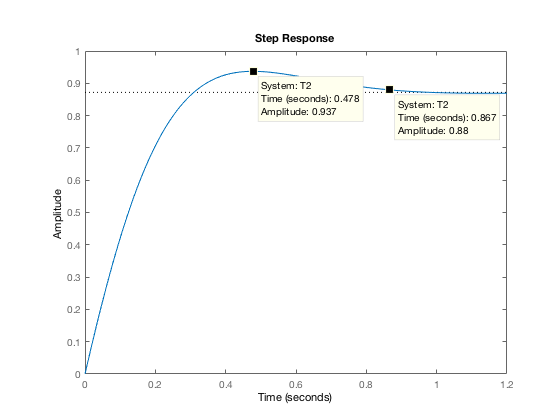
Prob 6

Settling time for uncompensated system is 1.72 seconds.

Plot generated from selecting a point using the command rlocfind(G) as pole input to the matlab script. New gain was found to be K = 4.6319 and the compensator used was (s + 7.2073)

Settling time was reduced to 0.86 seconds but the uncompensated steady state error was 0.94 while the compensated system generated a steady state error of 6.8151.

G = zpk([-6],[-2 -3 -5],1);

rlocus(G);

sgrid(1/sqrt(2), 0);

axis([-6 0 -4 4])

[gain, poles] = rlocfind(G);

t\_settle = 4/-real(poles(2));

sigma\_new = 8/t\_settle;

s\_new = -sigma\_new +sigma\_new\*1i;

new\_angle = ((s\_new + 6) / ((s\_new + 2)\*(s\_new + 3)\*(s\_new + 5)));

contrib = angle(new\_angle)\*(180/pi);

needed\_angle = 180-contrib;

z\_c = (sigma\_new / tand(needed\_angle)) + sigma\_new

comp\_gain = abs(((s\_new + 2)\*(s\_new + 3)\*(s\_new + 5)) / ((s\_new + 6)\*(s\_new + z\_c)));

close

G2 = zpk([-6 -z\_c],[-2 -3 -5],comp\_gain);

T2 = feedback(G2, 1);

step(T2)

ess\_uncomp = 6\*comp\_gain / (2\*3\*5)

ess\_comp = 6\*comp\_gain\*z\_c / (2\*3\*5)