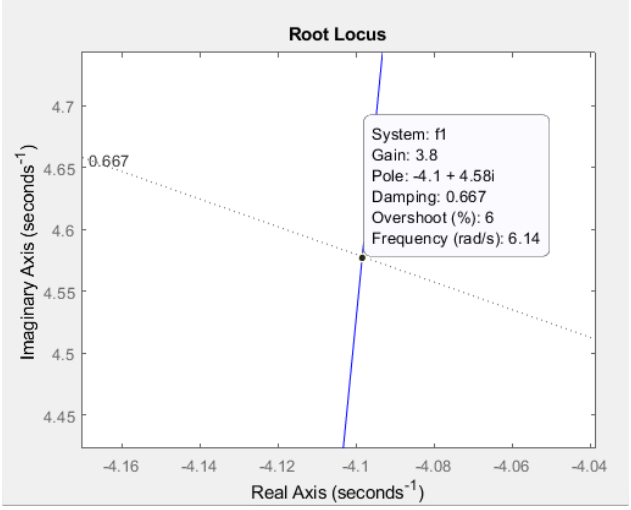
4-

$$Mp(\%) = a * 3\% \rightarrow Mp(\%) = 6\%$$

$$X = \left(\frac{Ln\left(\frac{Mp(\%)}{100}\right)}{\pi} \right)^2 \rightarrow X = 0{,}802$$

$$\xi = \left(\frac{X}{X+1}\right)^{1/2} \rightarrow \xi = 0{,}667$$



$$e(\infty) = \frac{1}{1+Kp}$$

$$Kp = \frac{\lim(Gs)}{s \rightarrow 0} * K \rightarrow Kp = 3{,}799$$

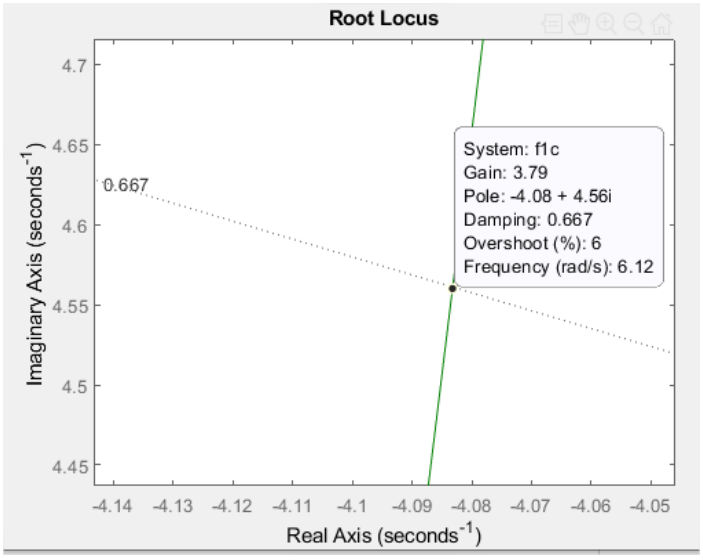
$$e(\infty) = \frac{1}{1+3{,}8} \rightarrow e(\infty) = 0{,}208$$

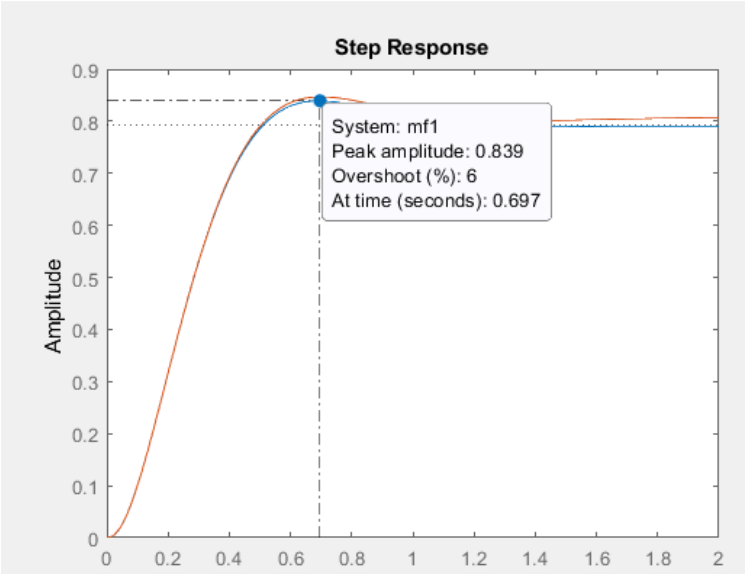
$$e(\infty)c = \frac{e(\infty)}{4} \rightarrow e(\infty)c = 0{,}0521$$

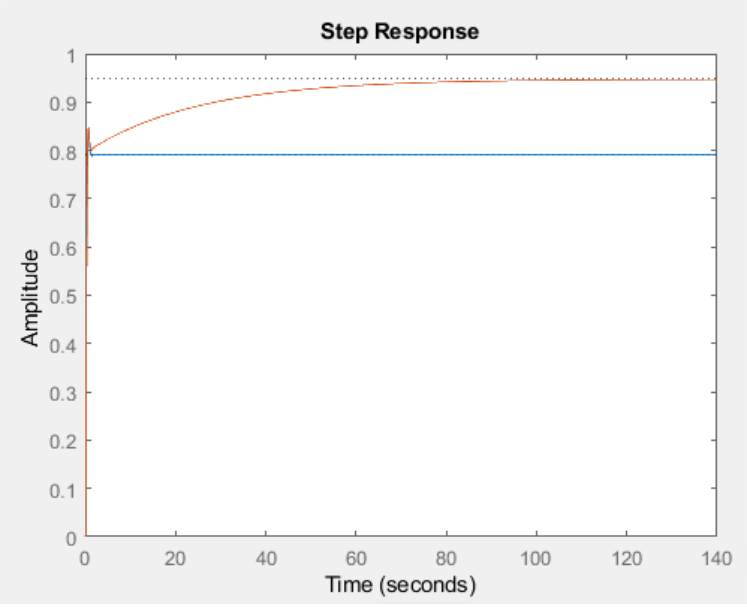
$$e(\infty)c = \frac{1}{1+Kpc} \rightarrow Kpc = 18{,}2$$

$$\frac{zc}{pc} = \frac{Kpc}{Kp} \rightarrow \frac{zc}{pc} = 4{,}79$$
$$se\ pc = 0{,}01 \rightarrow zc = 0{,}0479$$

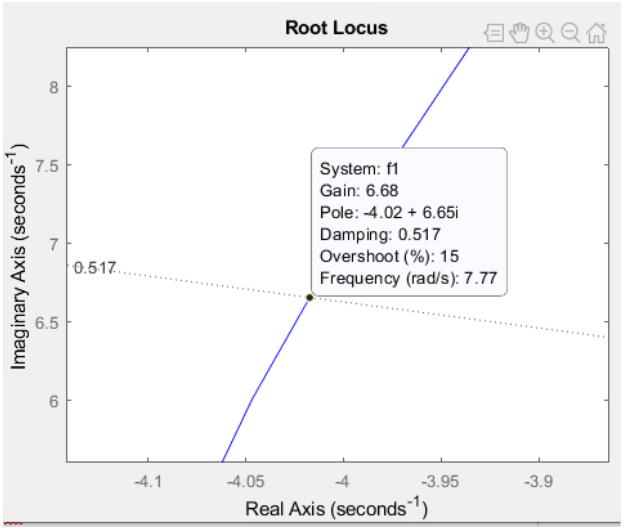
$$c * G(s) = \frac{(s+0{,}0479)}{(s+0{,}01)} * \left(\frac{1165}{(s+147{,}8) * (s+7{,}337) * (s+1{,}074)} \right)$$


Root Locus
Imaginary Axis (seconds^{-1})
Real Axis (seconds^{-1})
0.667
System: f1c
Gain: 3.79
Pole: -4.08 + 4.56i
Damping: 0.667
Overshoot (%): 6
Frequency (rad/s): 6.12


Step Response
Amplitude
System: mf1
Peak amplitude: 0.839
Overshoot (%): 6
At time (seconds): 0.697


Step Response
Amplitude
Time (seconds)

6-



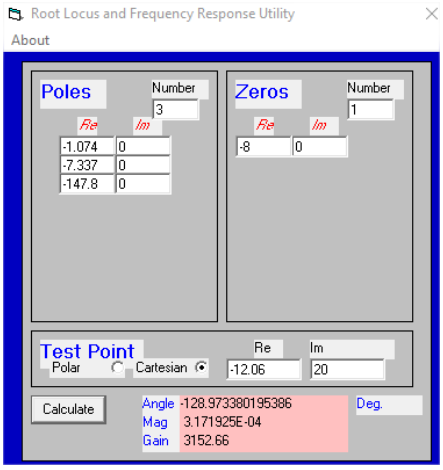
$$\mathrm{Ts} = \frac{4}{\mathrm{Re}} \rightarrow \mathrm{Ts} = 0{,}995$$

$$\mathrm{Tsc} = \frac{Ts}{3} \rightarrow \mathrm{Tsc} = 0{,}332$$

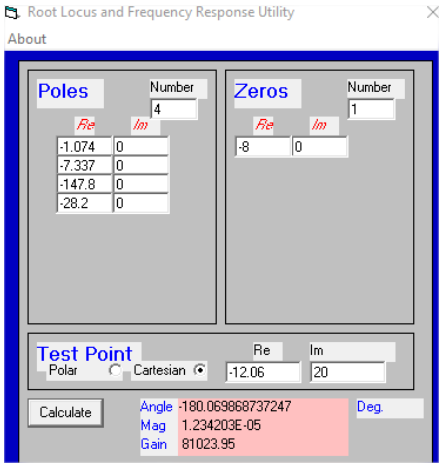
$$\mathrm{Tsc} = \frac{4}{\mathrm{Re}} \rightarrow \mathrm{Re} = 12{,}06$$

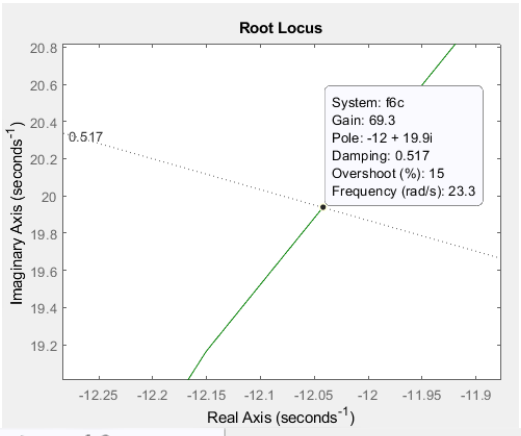
$$Ksi \ = \cos(\theta) \rightarrow \theta = 58{,}9$$

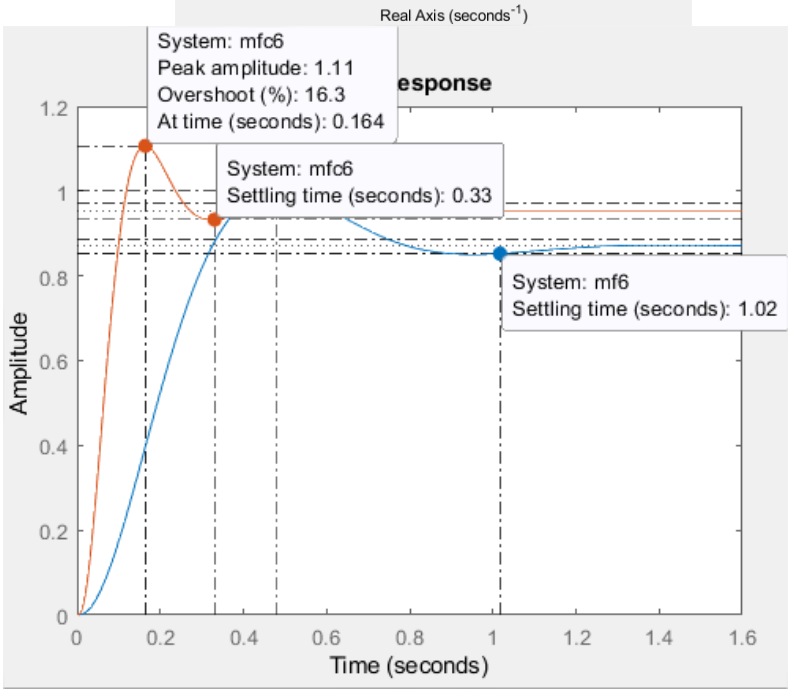
$$\mathrm{Im} = \mathrm{Re} * \mathrm{Tg}(\theta) \rightarrow Im = 20$$



$$\frac{20}{\mathrm{pc} - 12{,}06} = \mathrm{Tg}(180° - 129\ ) \rightarrow pc = 28{,}2$$


Root Locus and Frequency Response Utility
About
Poles
Number
4
Re
Im
-1.074
0
-7.337
0
-147.8
0
-28.2
0
Zeros
Number
1
Re
Im
-8
0
Test Point
Polar
Cartesian
Re
Im
-12.06
20
Calculate
Angle -180.069868737247
Mag 1.234203E-05
Gain 81023.95
Deg.


Root Locus
System: f6c
Gain: 69.3
Pole: -12 + 19.9i
Damping: 0.517
Overshoot (%): 15
Frequency (rad/s): 23.3
0.517
Imaginary Axis (seconds-1)
Real Axis (seconds-1)
20.8
20.6
20.4
20.2
20
19.8
19.6
19.4
19.2
-12.25
-12.2
-12.15
-12.1
-12.05
-12
-11.95
-11.9


System: mfc6
Peak amplitude: 1.11
Overshoot (%): 16.3
At time (seconds): 0.164
esponse
System: mfc6
Settling time (seconds): 0.33
System: mf6
Settling time (seconds): 1.02
Amplitude
Time (seconds)
1.2
1
0.8
0.6
0.4
0.2
0
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6