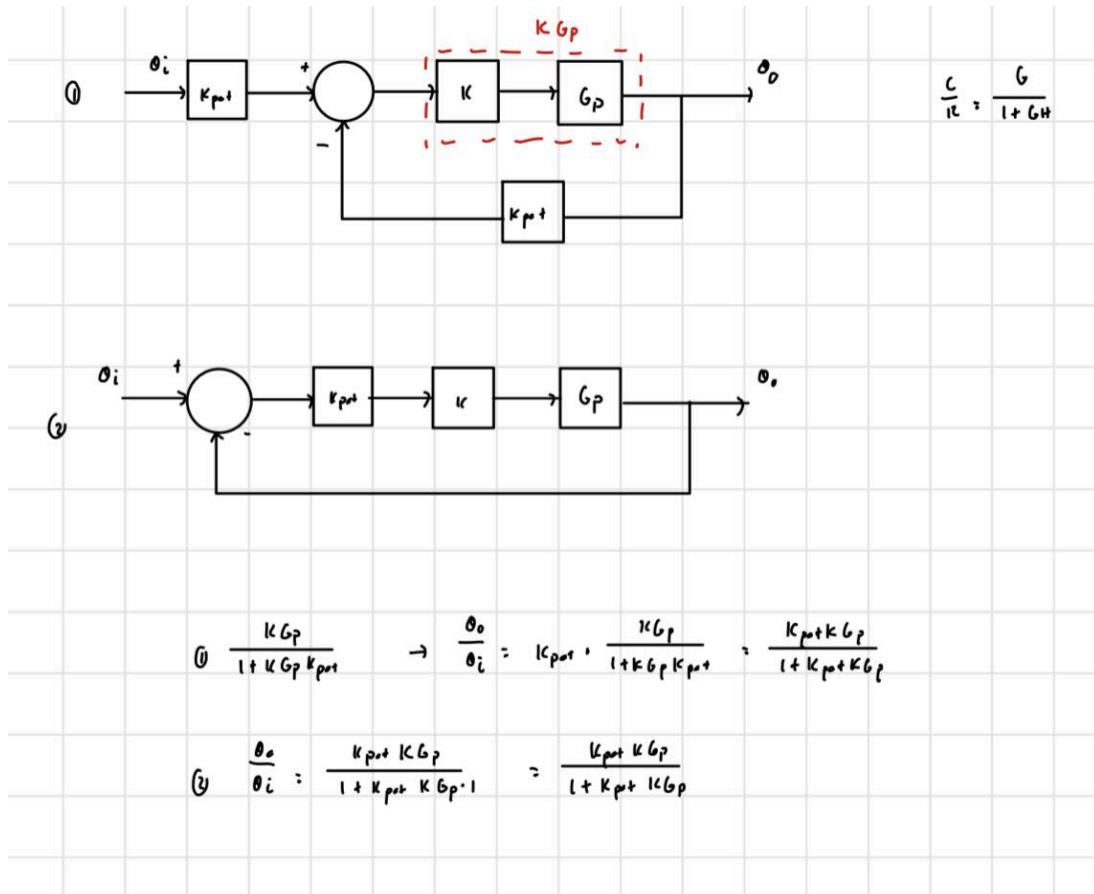


Ricardo Jimenez

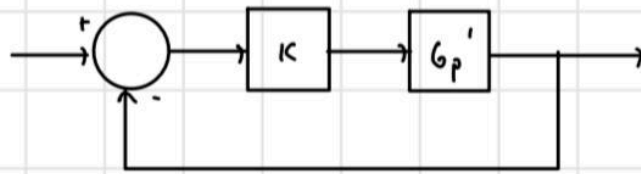
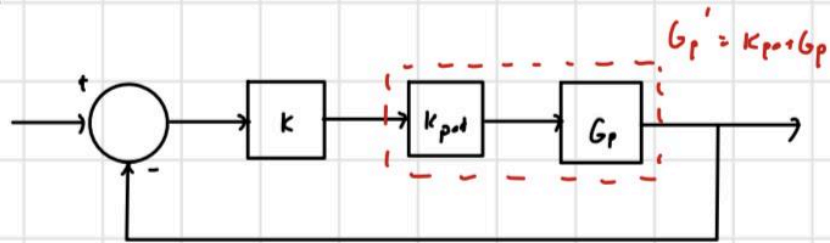
April 12, 2023

MAE 476, Sec 3

### Project 2

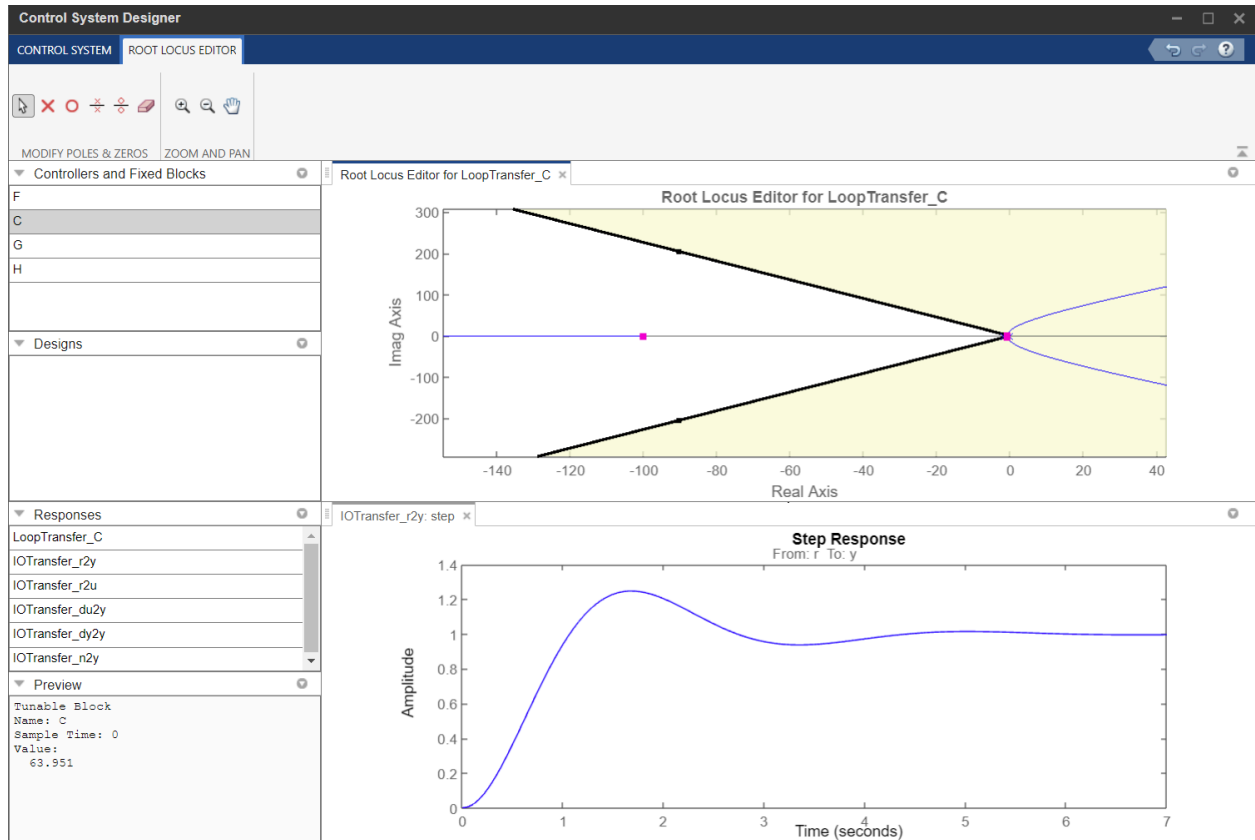


Step 2 :

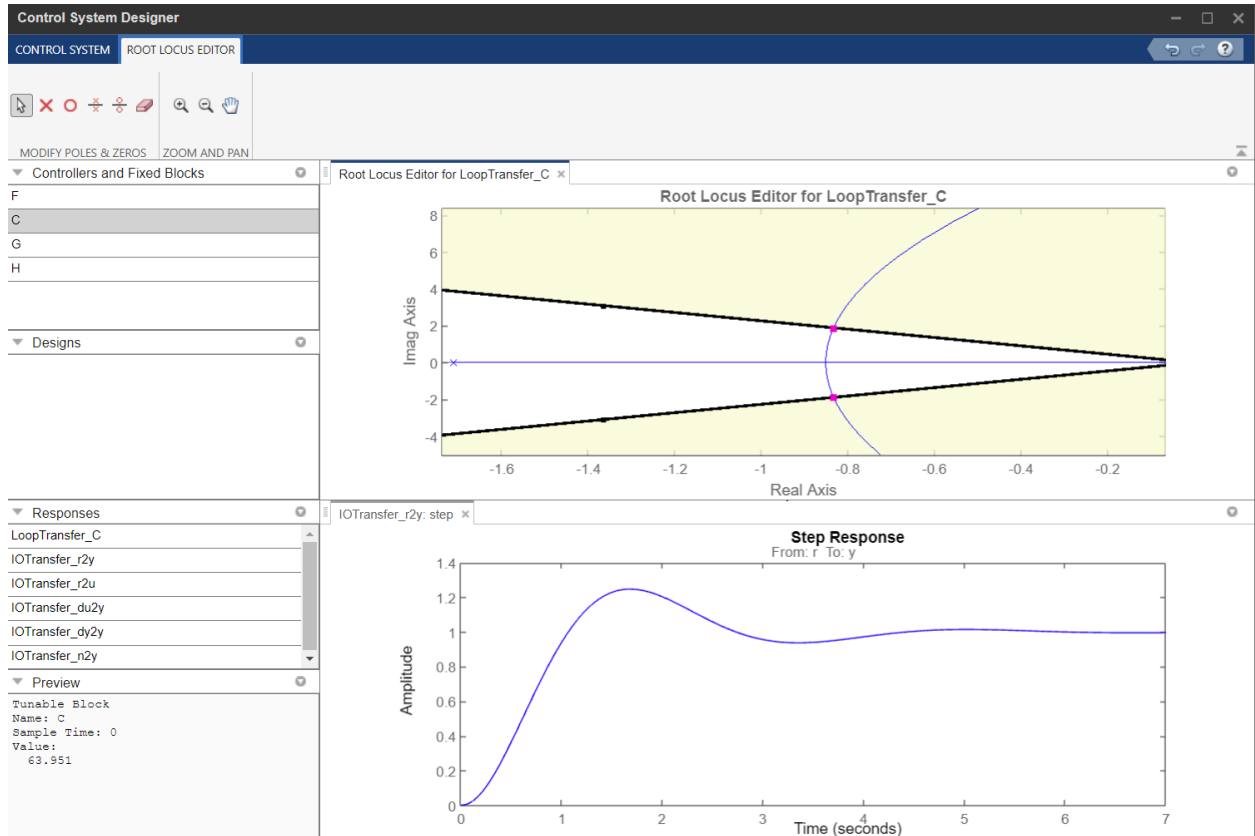


$$G_p' = k_{pot} G_p = k_{pot} \cdot \frac{k_i}{s+a} \cdot \frac{k_m}{s(s+a_0)} \cdot k_g$$
$$= 0.318 \cdot \frac{100}{s+100} \cdot \frac{2.083}{s(s+1.71)} \cdot 0.1$$

Root locus of  $G_p'$



Design requirement 25% overshoot, then move dots to lay on graph, then C gives the gain.



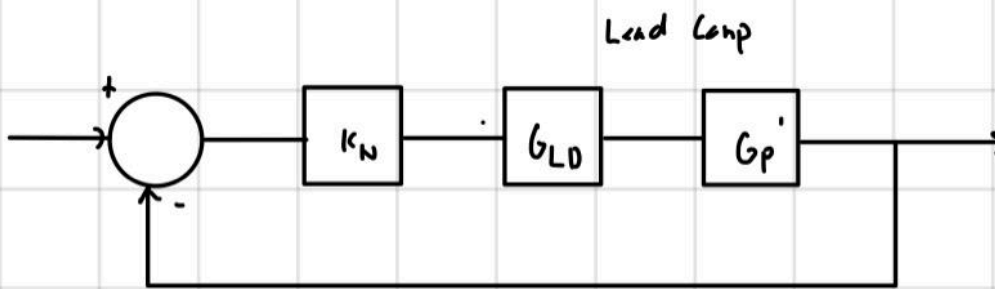
```
Gpp = zpk([], [0, -1.71, -100], 0.318*100*2.083*0.1)
controlSystemDesigner(Gpp)
r = rlocus(Gpp, 63.591)
```

```
Gpp =
    6.6239
-----
s (s+1.71) (s+100)

Continuous-time zero/pole/gain model.
Model Properties
r = 3x1 complex
10^2 x
-1.0004 + 0.0000i
-0.0083 + 0.0187i
-0.0083 - 0.0187i
```

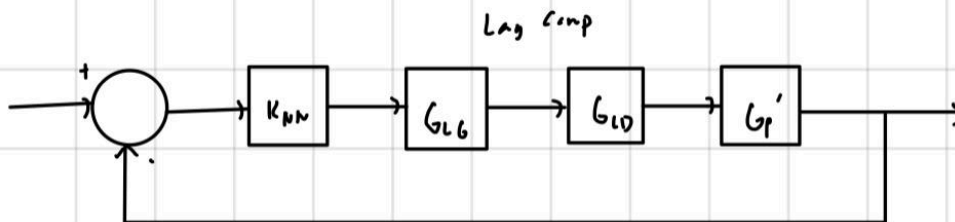
Plug gain into rlocus to find the roots

Step 3:

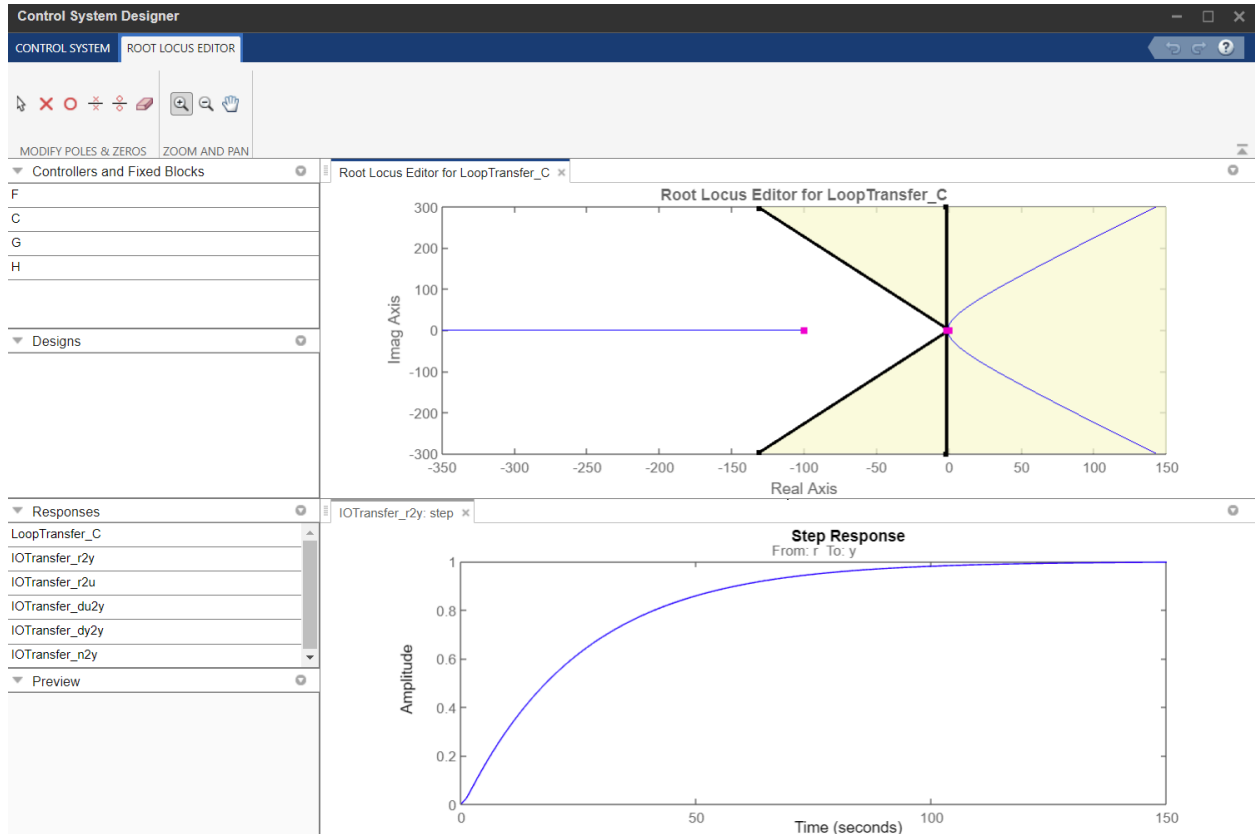


Root locus of  $G_{LD} G_{p'}$

Step 4:



Root locus of  $G_{LG} G_{LD} G_{p'}$



Add design requirements of 25% overshoot and 2 second settling time to the new system and find intersection of root locus and ray.

$$Z = -0.85$$

$$e(ss) = 1/(1+k_p) = 1/(1+\lim_{s \rightarrow 0} G(s))$$

$$G = k \cdot G_{pp}$$