

# EE302 Homework 3

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a)

```
p1 = [1 20 10 400];
p2 = [1 3 2 6 3 1];
p3 = [1 -1 2 -4 -8];
p4 = [1 2 16 32 100 200];
roots1 = roots(p1);
roots2 = roots(p2);
roots3 = roots(p3);
roots4 = roots(p4);
```

Results are (in 2 significant digit); polynomial 1 has roots at

$$\lambda_1 = -20, 47 + 0, 00i$$

$$\lambda_2 = 0, 23 + 4, 41i$$

$$\lambda_3 = 0, 23 - 4, 41i$$

I expect two positive pole from routh-hurwitz test. Result make sense.

polynomial 2 has roots at

$$\lambda_1 = -2, 91$$

$$\lambda_2 = 0, 23 + 1, 33i$$

$$\lambda_3 = 0, 23 - 1, 33i$$

$$\lambda_4 = -0, 28 + 0, 34i$$

$$\lambda_5 = -0, 28 - 0, 34i$$

From Routh-Hurwitz test i expect 2 positive pole. Matlab result consistent.

polynomial 3 has roots at

$$\lambda_1 = 2.00$$

$$\lambda_2 = 2.00i$$

$$\lambda_3 = -2.00i$$

$$\lambda_4 = -1.00$$

From Routh-Hurwitz test i expect two poles on jw axis and one pole at RHP. Matlab results make sense.

polynomial 4 has roots at

$$\lambda_1 = 1,00 + 3,00i$$

$$\lambda_2 = 1,00 - 3,00i$$

$$\lambda_3 = -1,00 + 3,00i$$

$$\lambda_4 = -1,00 - 3,00i$$

$$\lambda_5 = -2,00$$

From Routh-Hurwitz test i expect two RHP poles with quadrantal pair at LHP. Matlab result are same.

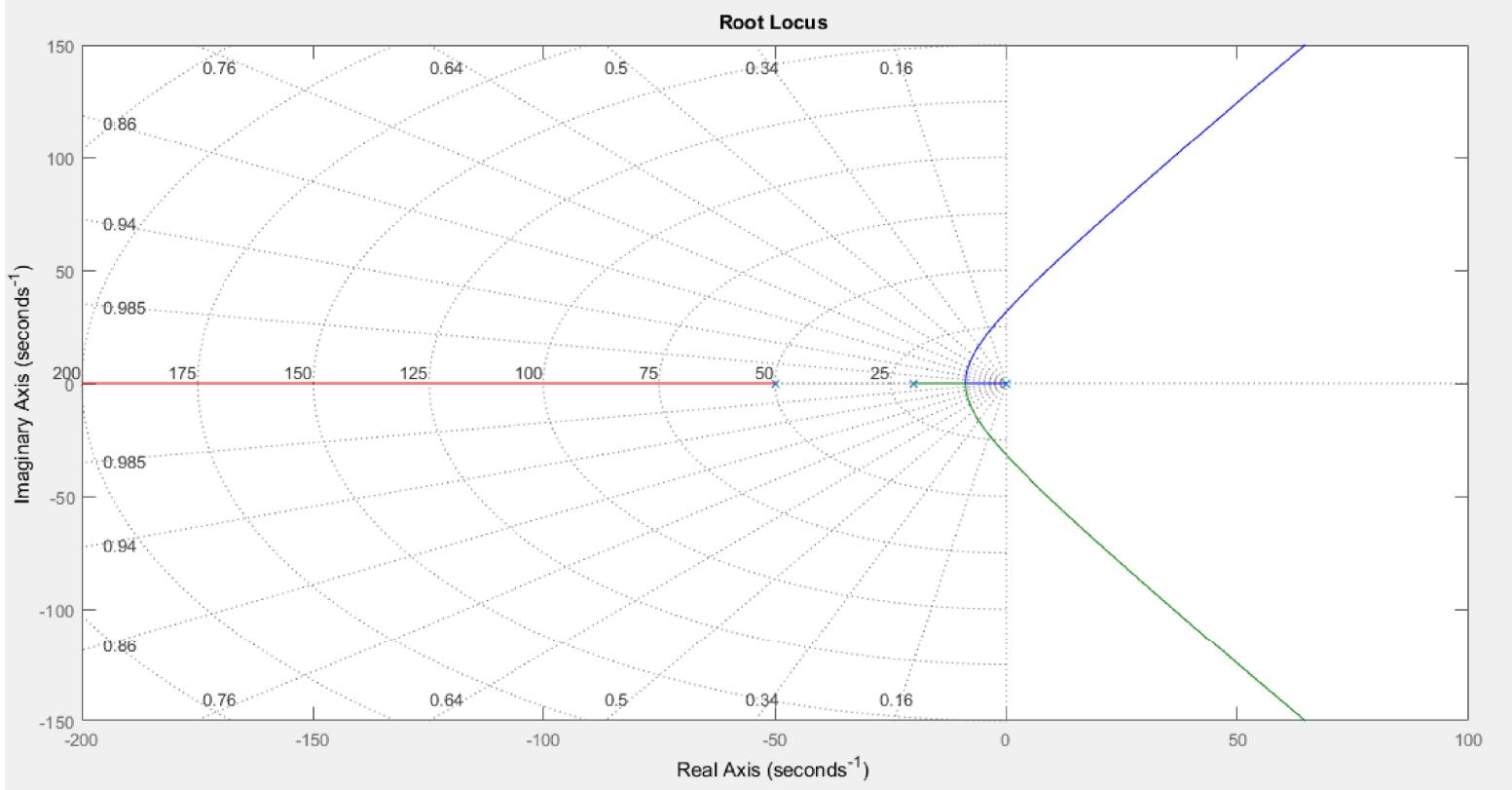


Figure 1: 3a

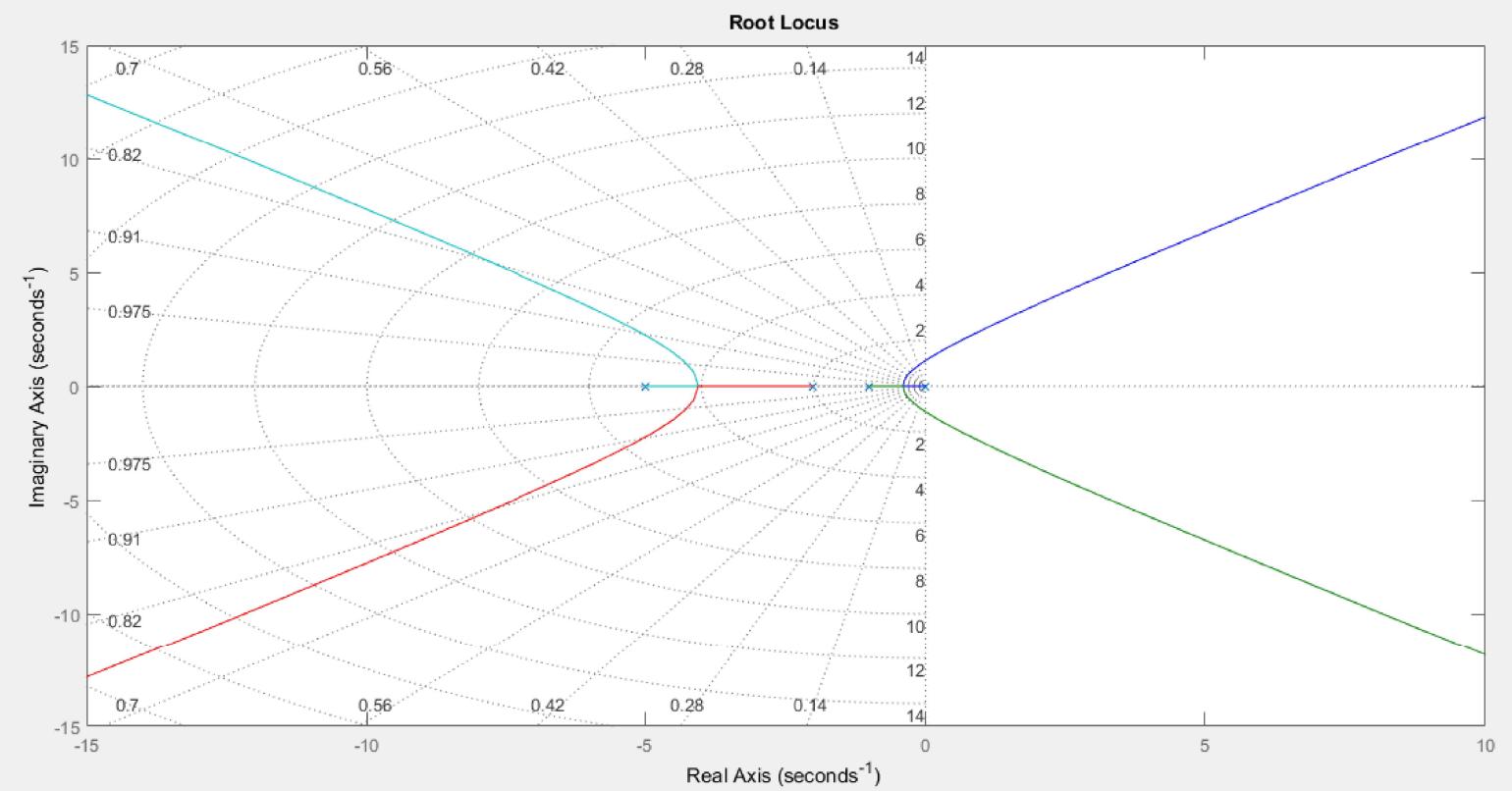


Figure 2: 3b

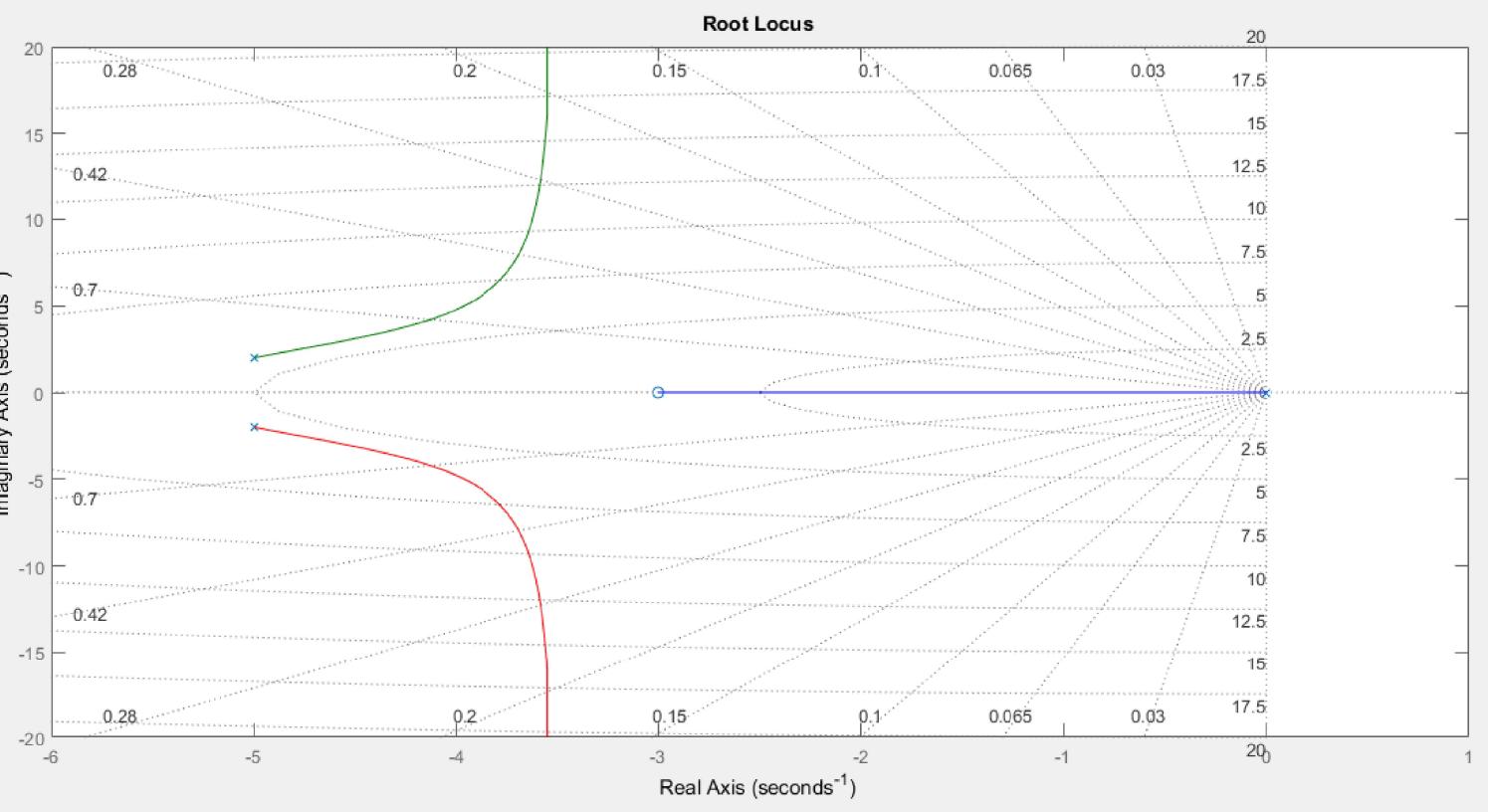


Figure 3: 3c

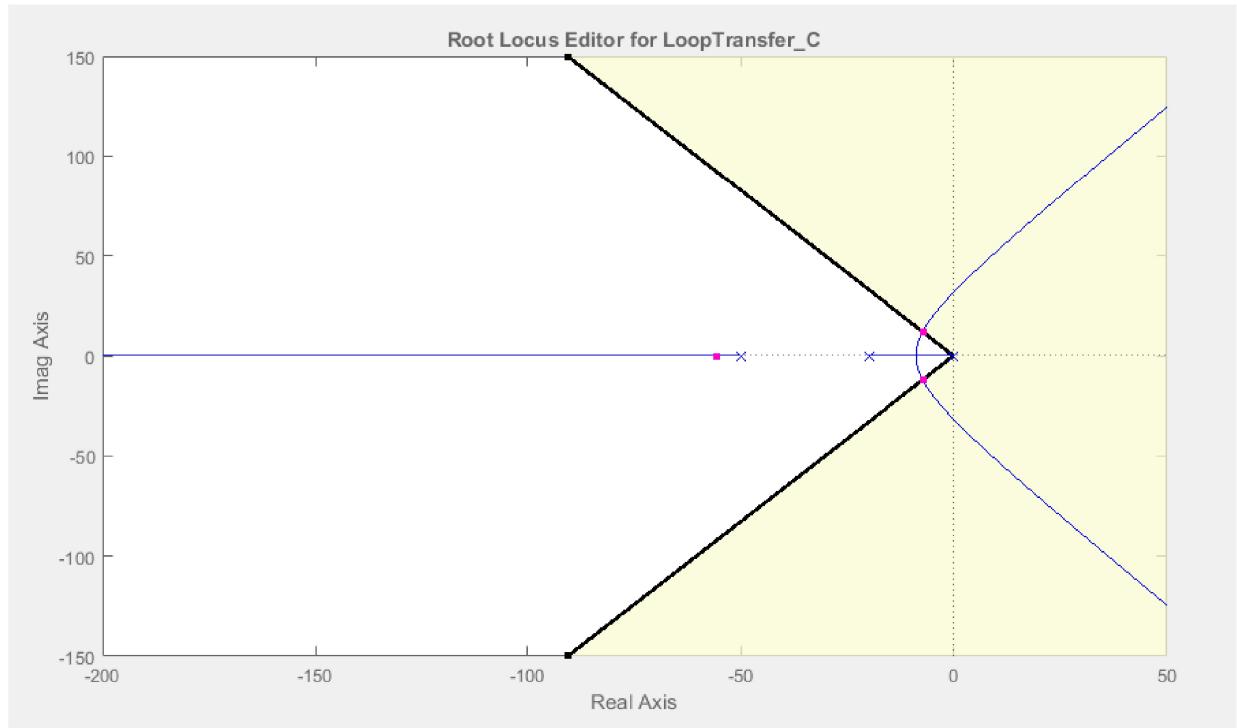


Figure 4: root locus

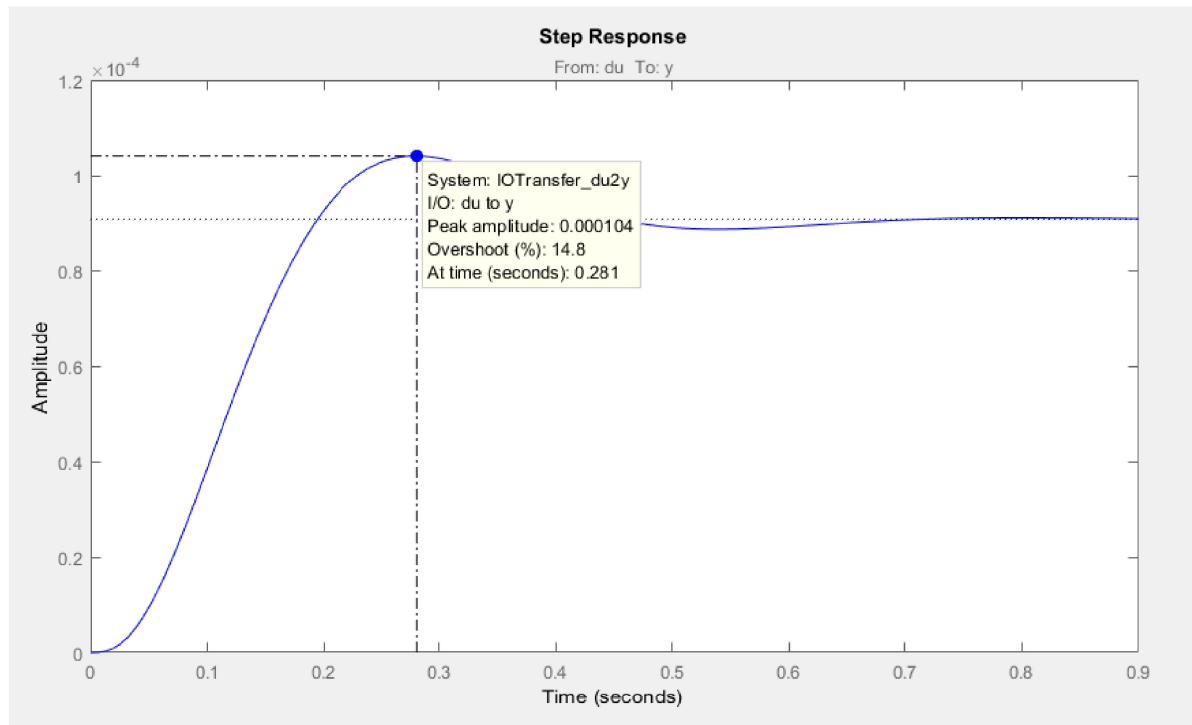


Figure 5: step response