



Faculty of Engineering & Technology
Electrical & Computer Engineering Department

ENEE3302

Matlab Project

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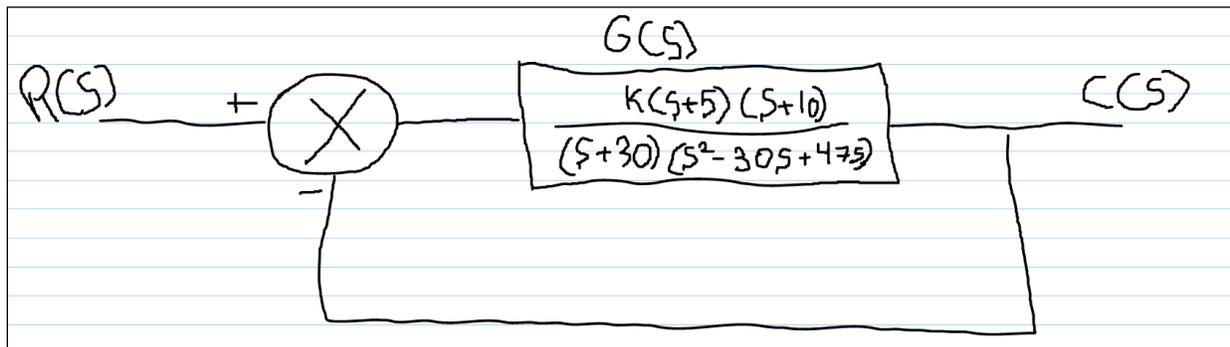
ID Number : 1181404

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Section : 1

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For the unity feedback system



$$G(s) = \frac{K(s+5)(s+10)}{(s+30)(s^2-30s+475)} = \frac{K(s^2+15s+50)}{s^3-425s+14250}$$

Sketch the root locus

The command window shows the code that I wrote to define the transfer function and sketch the root locus.

```
Command Window
>> sys = tf([1 15 50], [1 0 -425 14250])

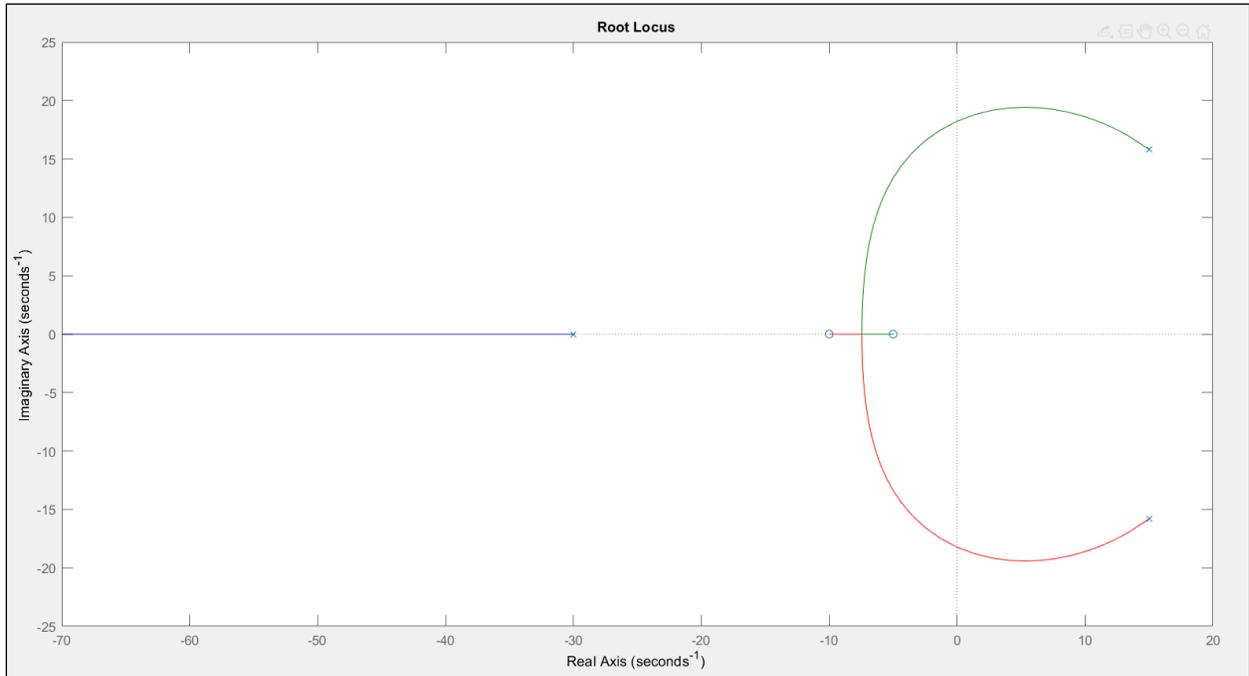
sys =

      s^2 + 15 s + 50
      -----
      s^3 - 425 s + 14250

Continuous-time transfer function.

>> rlocus(sys)
fx >>
```

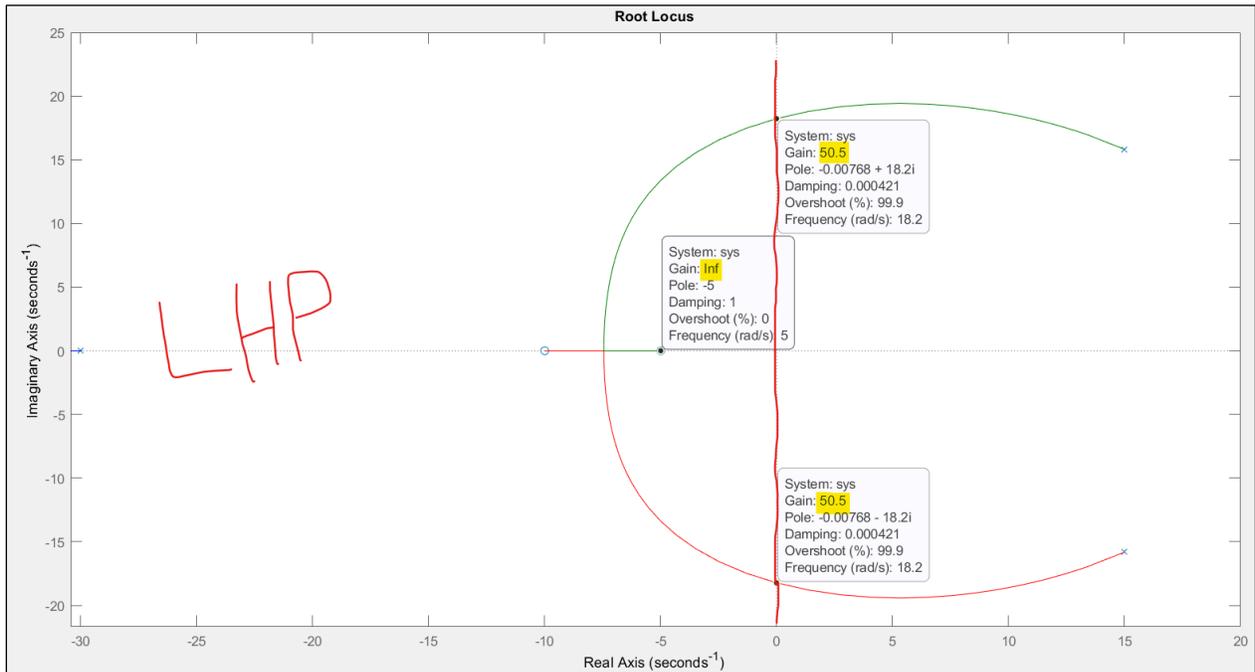
We can see that the root locus is symmetrical about the real axis, and the poles go to the zeros.



Find the range of gain, K that makes the system stable.

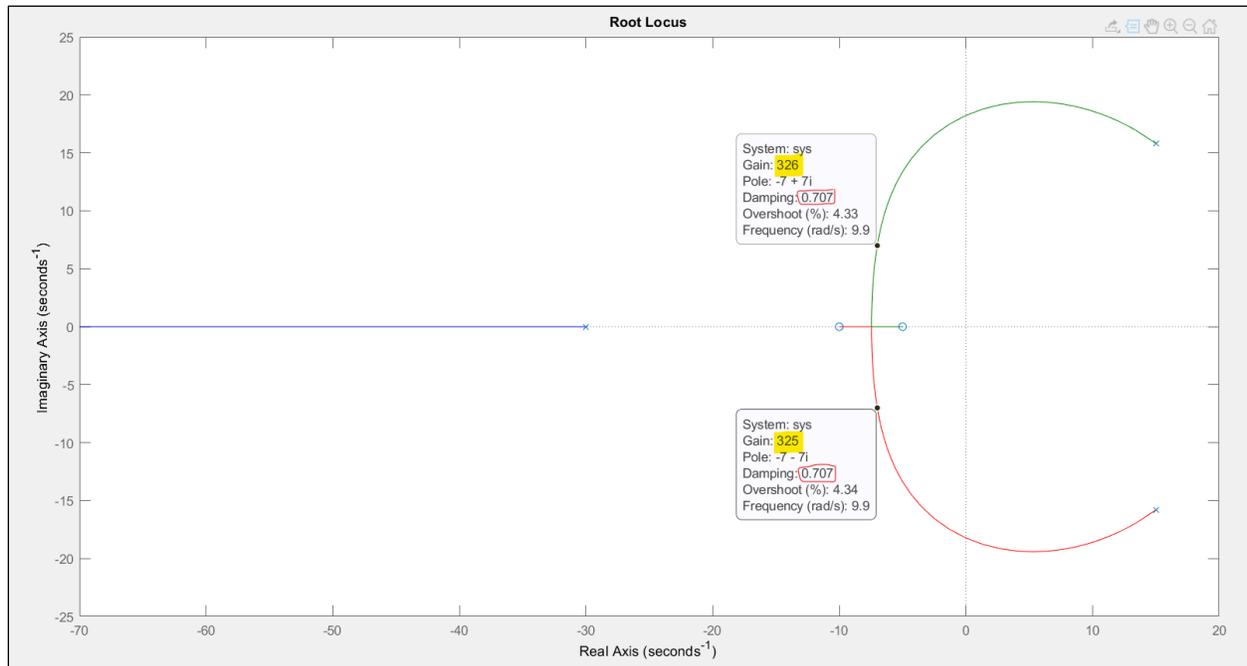
$$50.5 < K < \infty$$

When k = 50.5, the system will be marginally stable.



Find the value of K that yields a damping ratio of 0.707 for the system's closed-loop dominant poles.

When damping ratio = 0.707, K = 326.



Find the value of K that yields closed-loop critically damped dominant poles.

When damping ratio = 1, K = 2.72e+03.

