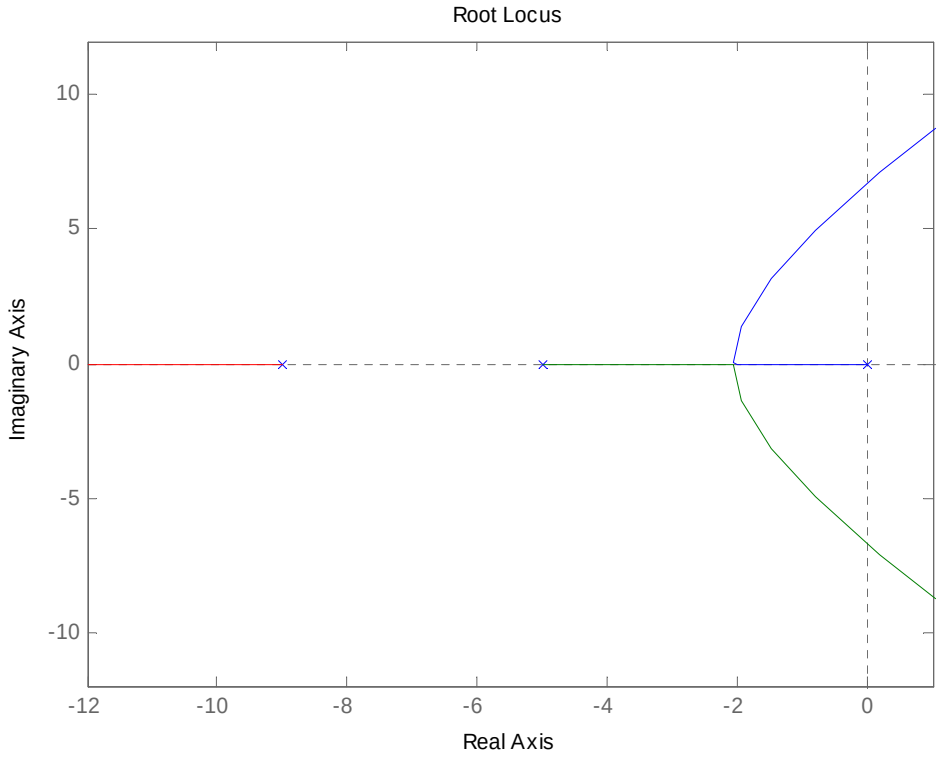
ECE-320, Practice Quiz #6

Problems 1 and 2 refer to the following root locus plot.



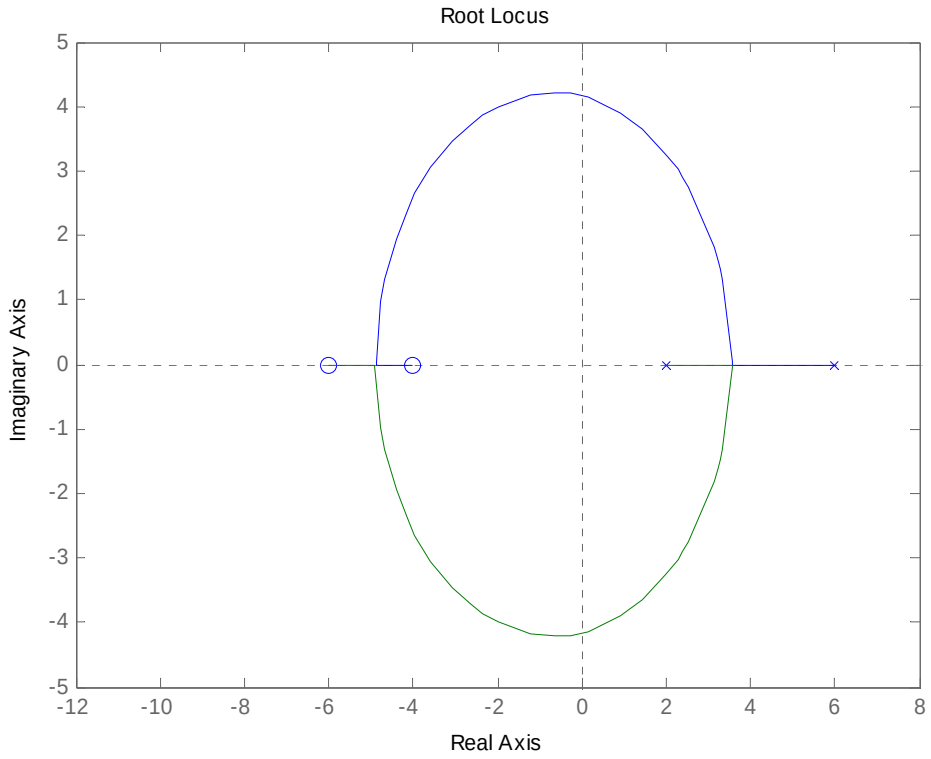
1) Is it possible to find a value of *k* so that -6 is a closed loop pole?

a) Yes b) No

2) When k = 623 two poles of the closed loop system are purely imaginary. In order for the system to remain stable

a) $0 < k < 623$ b) $k > 623$ c) $k > 0$ d) $k < 0$

Problems 3 and 4 refer to the following root locus plot



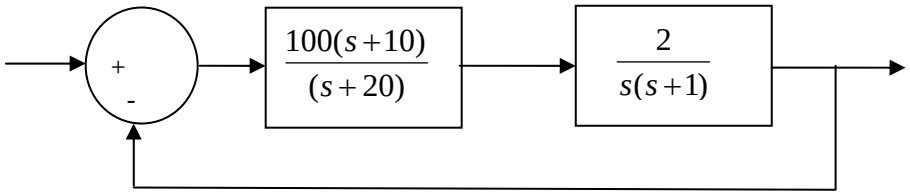
3) Is it possible to find a value of *k* so that -5 is a closed loop pole?

a) Yes b) No

4) When k = 0.795 two poles of the closed loop system are purely imaginary. In order for the system to remain stable

a) $0 < k < 0.795$ b) $k > 0.795$ c) $k > 0$ d) $k < 0$

Problems 5-9 refer to the following system



The closed loop poles of the system are at $-2.91 \pm 11.1j$ and -15.2

5) The best estimate of the **settling time** is

a) $\frac{4}{1}$ seconds b) $\frac{4}{20}$ seconds c) $\frac{4}{15.2}$ seconds d) $\frac{4}{2.91}$ seconds

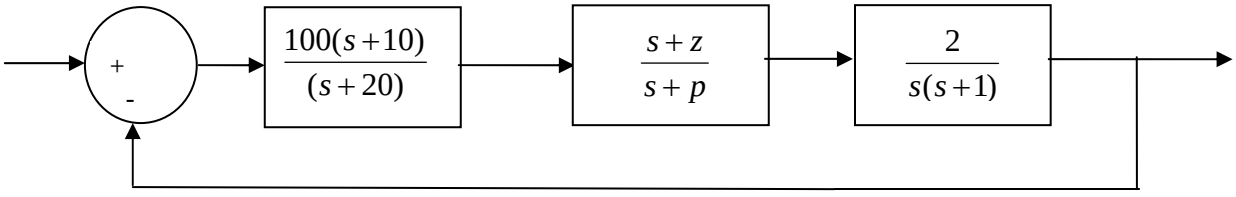
6) The best estimate of the **steady state error** for a **unit step** input is

a) $\frac{1}{101}$ b) $\frac{1}{100}$ c) 0 d) ∞

7) The best estimate of the **steady state error** for a **unit ramp** input is

a) 0 b) ∞ c) $\frac{1}{100}$ d) $\frac{1}{101}$

8) Now we add a lag compensator to change the steady state error for a ramp input, as shown below



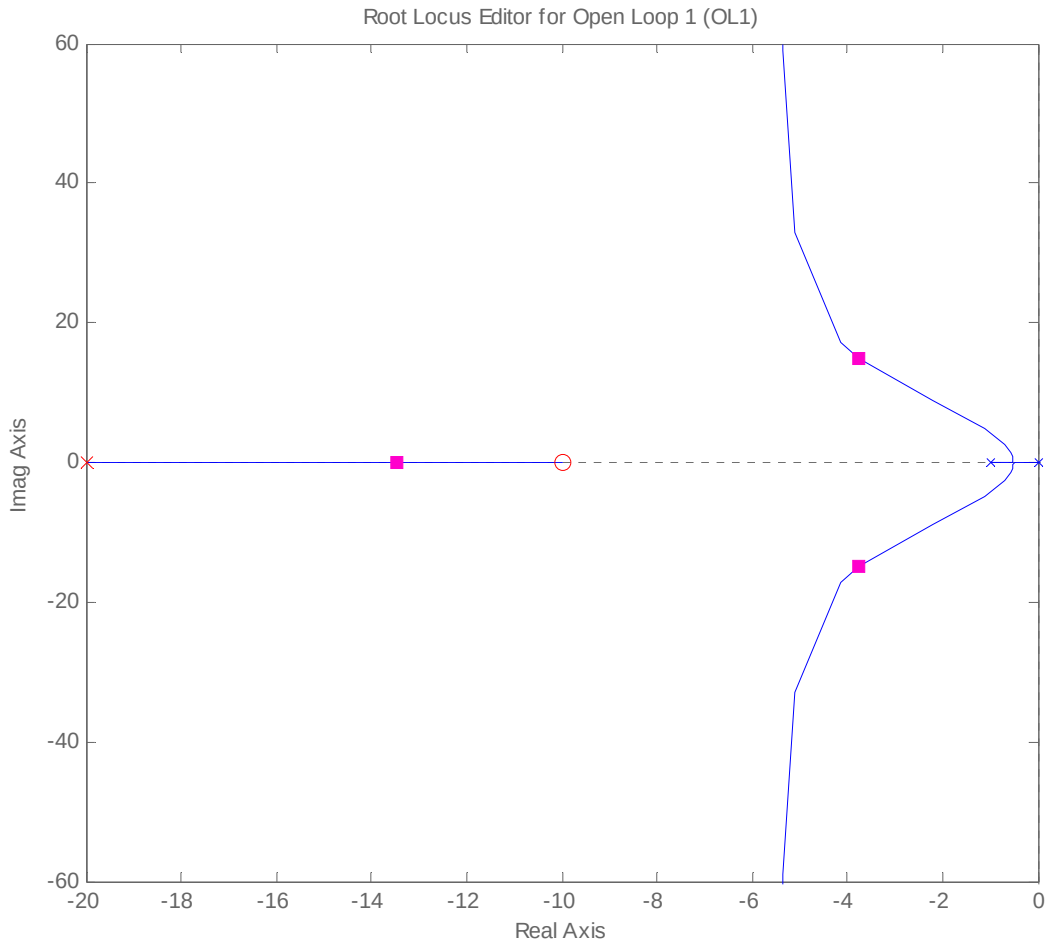
If we want the **steady state error** for a unit ramp input to be 0.001 and we choose z = 0.1, what should p be?

a) 1 b) 0.1 c) 0.01 d) 0.001

9) With the lag compensator in the system (as shown in problem 8) do we expect the **settling time** of the system to

a) increase b) decrease c) remain the same

Problems 10-12 refer to the following root locus plot for a unity feedback system with a plant and a controller.



10) Based on this root locus plot, the best estimate of the poles of the closed loop system are

a) 0, -2, and -20 b) -4+18j, -4-18j, -14

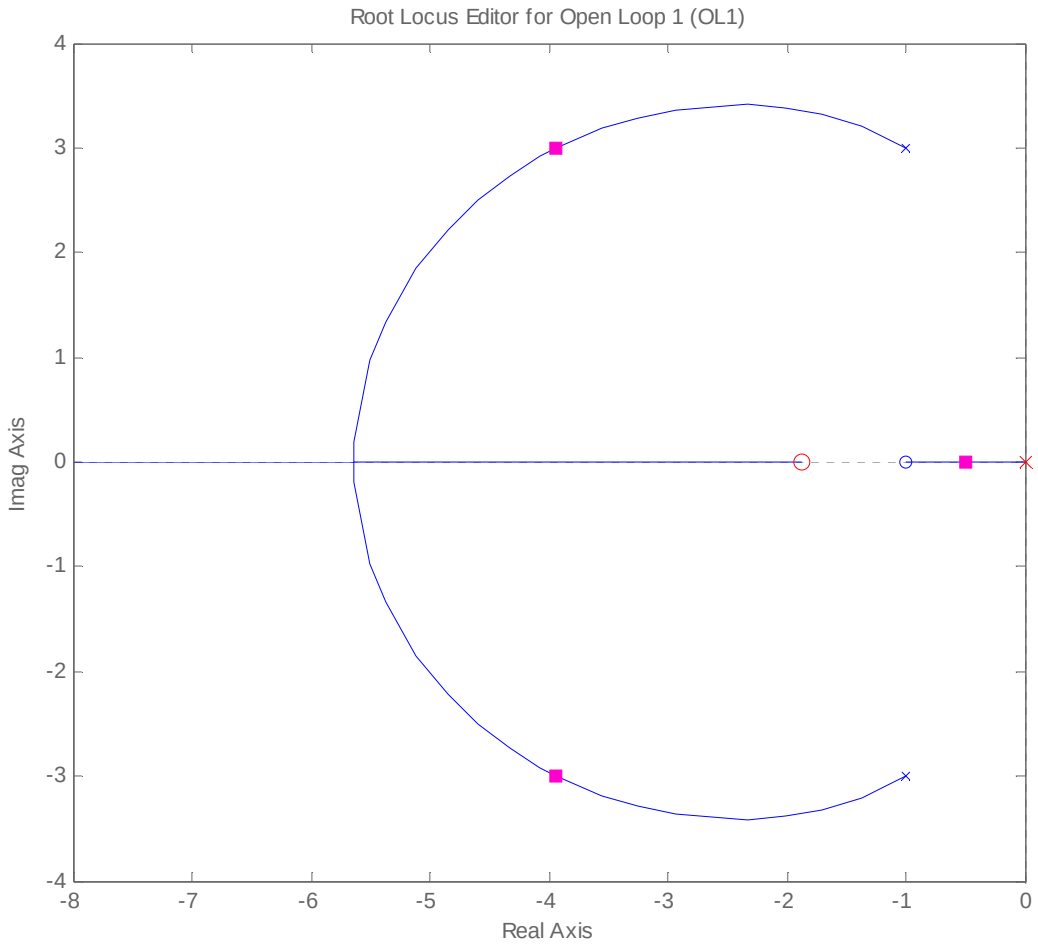
11) Is this a type one system?

a) yes b) no

12) Is this a stable system?

a) yes b) no

Problems 13-15 refer to the following root locus plot for a unity feedback system with a plant and a controller.



13) Based on this root locus plot, the best estimate of the poles of the closed loop system are

a) -1+j3, -1-3j b) -4+3j, -4-3j, -0.5

14) Is this a type one system?

a) yes b) no

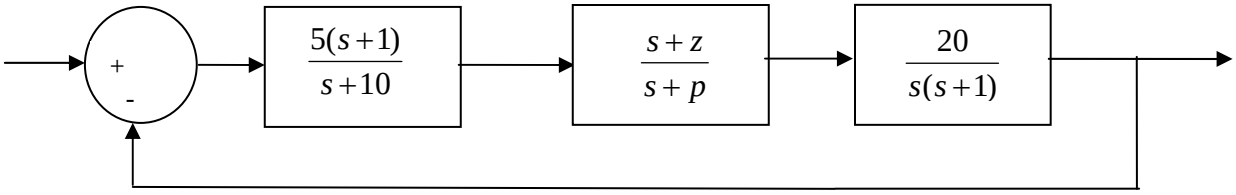
15) Is this a stable system?

a) yes b) no

16) Assume we use a lag compensator properly to achieve the desired steady state error for a ramp input. We should expect the **settling time** of the system to

a) increase b) decrease c) remain the same

17) Assume we add a lag compensator to change the velocity error, as shown below



If we want the **steady state error** for a unit ramp input to be 0.001 and we choose $z = 0.1$, what should p be?

a) 1 b) 0.1 c) 0.01 d) 0.001

Answers: 1-b, 2-a,
3-a, 4-b,
5-d, 6-c, 7-c, 8-c, 9-c,
10-b, 11-a, 12-a,
13-b, 14-a, 15-a
16-c, 17-d