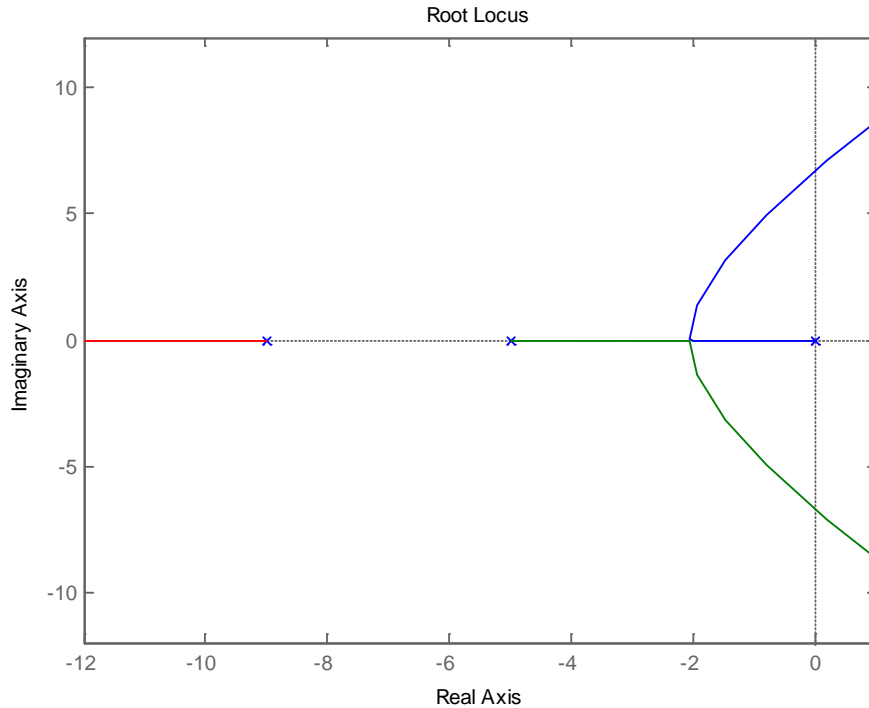Problems 1-5 refer to the following root locus plot.

1) Is it possible to find a value of k so that -6 is a closed loop pole?   a) Yes   b) No
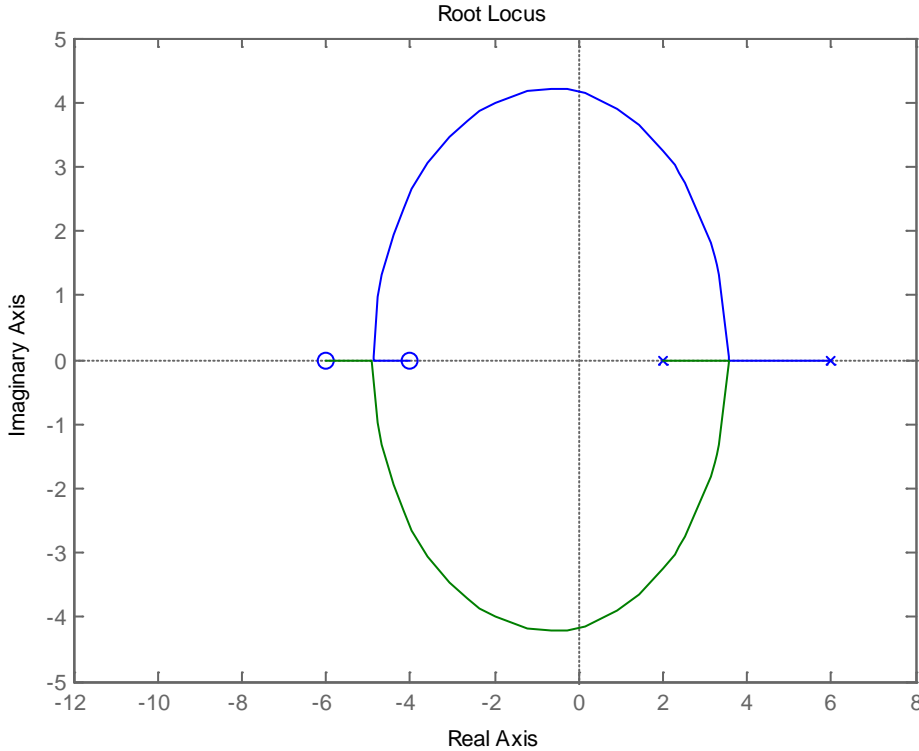
2) When k = 623 two poles of the closed loop system are purely imaginary. In order for the system to remain stable

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

3) Is it possible to choose k so the system becomes unstable?

a) Yes   b) No   c) It is not possible to determine given this root locus plot

4) What type of system is this?

a) Type 0 b) Type 1   c) Type 2   d) Type 3   e) It is not possible to determine given this root locus plot

5) Is it possible to choose the poles so there is no overshoot (assuming the zeros do not affect the answer)?

a) Yes   b) No   c) It is not possible to determine given this root locus plot

Problems 6-10 refer to the following root locus plot

Root Locus

6) Is it possible to find a value of k so that -5 is a closed loop pole?   a) Yes   b) No

7) 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) $k < 0$

8) Is it possible to choose k so the system becomes unstable?

a) Yes   b) No   c) It is not possible to determine given this root locus plot

9) What type of system is this?

a) Type 0 b) Type 1   c) Type 2   d) Type 3   e) It is not possible to determine given this root locus plot

10) Is it possible to choose the poles so there is no overshoot (assuming the zeros do not affect the answer)?

a) Yes   b) No   c) It is not possible to determine given this root locus plot

Problems 11-13 refer to the following root locus plot for a unity feedback system with a plant and a controller.

Root Locus Editor for Open Loop 1 (OL1)
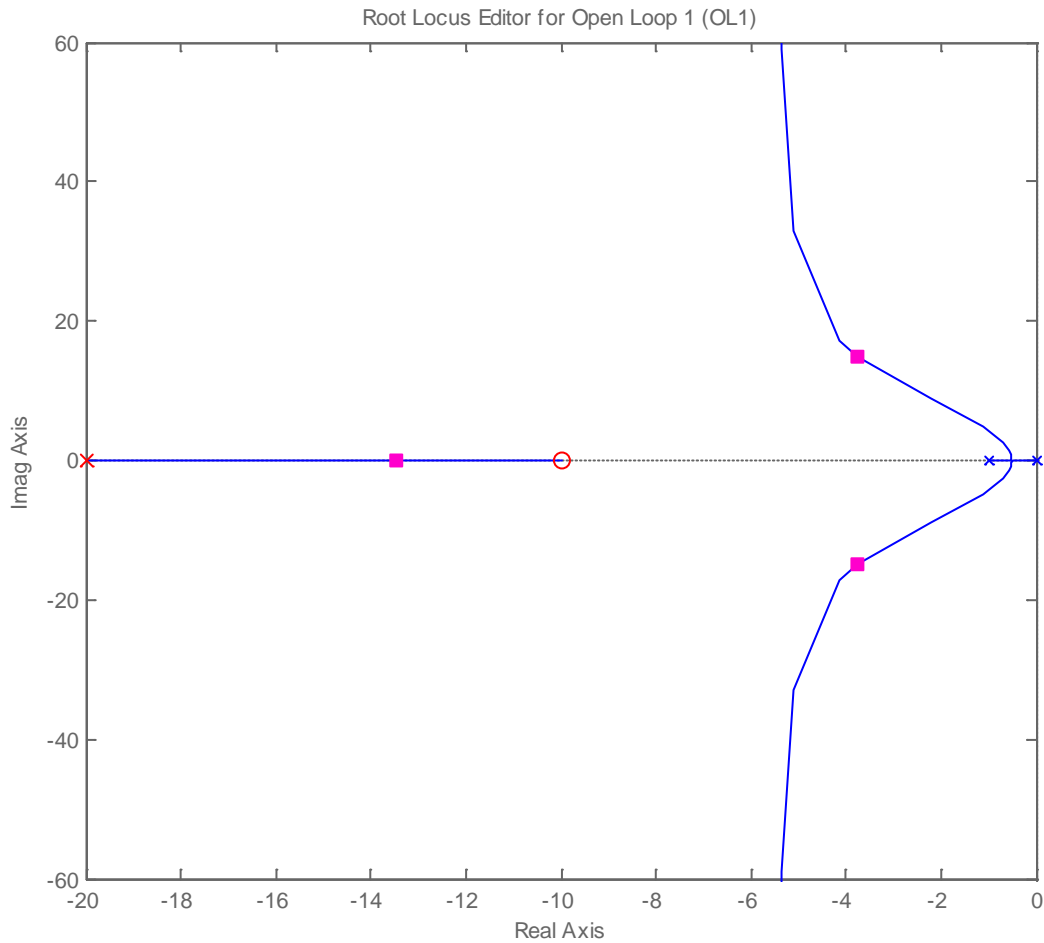
11) Based on this root locus plot, the best estimate of the poles of the closed loop system are
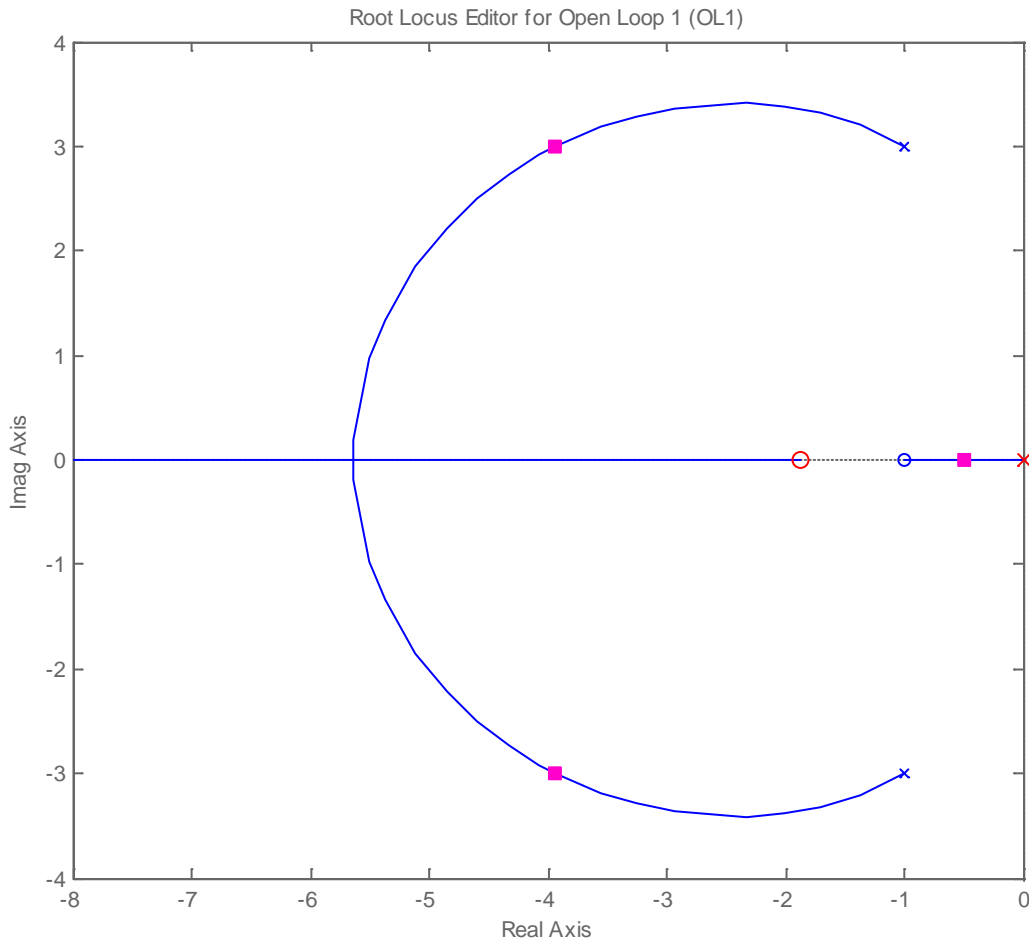
a) 0, -2, and -20   b) -4+18j, -4-18j, -14

12) Is this a type one system?

a) yes   b) no

13) Is this a stable system?

a) yes   b) no

Problems 14-16 refer to the following root locus plot for a unity feedback system with a plant and a controller.

Root Locus Editor for Open Loop 1 (OL1)

14) Based on this root locus plot, the best estimate of the poles of the closed loop system are
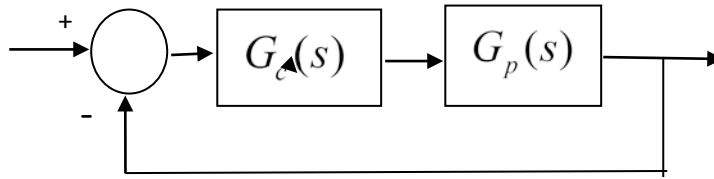
a) -1+j3, -1-3j   b) -4+3j, -4-3j, -0.5

15) Is this a type one system?

a) yes   b) no

16) Is this a stable system?

a) yes   b) no

Problems 17-19 refer to the following system, where $G_p(s) = \dfrac{2}{s+3}$ and $G_c(s) = k$

17) For this system, the position error constant, K_p, is

a) k b) $\dfrac{k}{3}$ c) $\dfrac{2k}{3}$ d) none of these

18) The steady state error for a unit step input is

a) $e_{ss} = 0$ b) $e_{ss} = \dfrac{1}{k}$ c) $e_{ss} = \dfrac{1}{1+k}$ d) $e_{ss} = \dfrac{3}{k}$ e) $e_{ss} = \dfrac{3}{3+k}$ f) $e_{ss} = \dfrac{3}{2k}$ g) none of these

19) The (2%) settling time for this system is

a) $T_s = \dfrac{4}{1+2k}$ b) $T_s = \dfrac{4}{3+2k}$ c) $T_s = \dfrac{4}{2+3k}$ d) none of these

Answers: 1-b, 2-a, 3-a, 4-b, 5-a, 6-a, 7-b, 8-a, 9-a, 10-a, 11-b, 12-a, 13-a, 14-b, 15-a, 16-a, 17-c, 18-g, 19-b