Ain Shams University
Faculty of Engineering
Computer & Systems Eng. Dept.

CSE 371 - Control Systems (1) 2016-2017

Assignment #2

(Due on: Tuesday, January 17th at mid-night)

Question 1

Using MATLAB (or any tool of your choice), show the plot of the root locus of the closed-loop feedback system with

$$G(s)=\frac{2K(s+1)}{s^2(s+3)(s+6)}, H(s)=1$$

From the graph, find the range of K for stability. Submit your code.

Question 2

Using MATLAB (or any tool of your choice), show the plot of the root locus of the closed-loop feedback system with

$$G(s)=\frac{K(s+9)}{s(s^2+4s+11)}, H(s)=1$$

From the graph, find the closed-loop poles with damping ratio 0.5. Find the corresponding value of K. Submit your code.

Question 3

Consider the closed-loop feedback system with

$$G(s)=\frac{1}{s^2+1}, H(s)=1$$

Find the parameters K and a of the compensator $G_c(s)=\frac{K(s+1)(s+a)}{s}$ such that the closed-loop poles are located at $s=-1\pm j\sqrt{3}$. Using MATLAB (or any tool of your choice), show the unit-step response of the system before and after compensation.

Question 4

Using MATLAB (or any tool of your choice), show the Bode plot of the open-loop transfer function of the system with

$$G(s)=\frac{10K(s+0.3)}{s(s+1)(s+2)}, H(s)=1$$

Find the value of the gain K such that the phase margin is exactly 40°. What is the gain margin of this system with this value of gain? Submit your code.