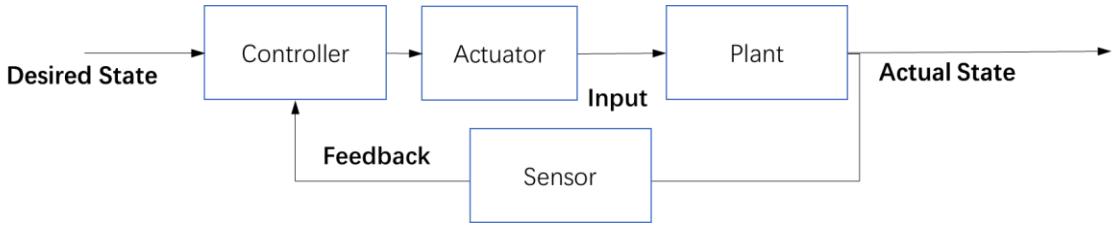
ECE 486: Control Systems — Assignment # 00

Issued: Oct 01 — Due: Oct 08, 2023

Question 1 (6 points)

Give an example of a closed loop control system. Using your example, explain the following terms associated with the control system represented by Figure 1:

a) Plant
b) Sensors
c) Actuator
d) Desired State
e) Actual State
f) Feedback



Question 2 (9 points)

Given $\mathrm{z} = \frac{1}{j}\left(\frac{1-j}{2+2j} - \frac{1+j}{2-2j}\right)$

a) Write z in the form $\alpha + \beta j$
b) Sketch z in the complex plane
c) Obtain the inverse of z in polar form
d) Given $x^3 = -8$, find the complex values of x that satisfy the equation.

Question 3 (5 points)

Consider the following differential equation:

$\ddot{x}(t) + 5\dot{x}(t) + 2x(t) = 0$. Find all values of λ such that $x(t) = e^{\lambda t}$ satisfies the above differential equation.