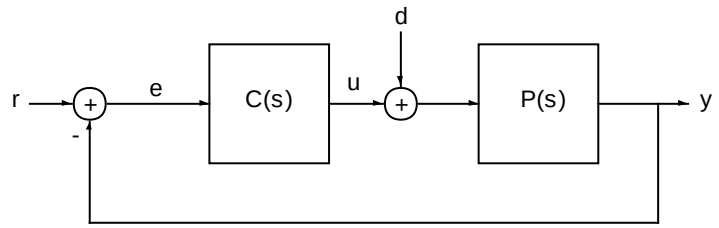
EEE 304, HW 5

Problem 1:
For the feedback system shown below, compute the transfer functions u/r, u/d, y/r, y/d.



Problem 2: (Low Bandwidth Controller)
For the feedback system of Problem 1, suppose $P(s) = 10/(0.3s+1)$.

a. When *C(s) = K*, design K so that the loop crossover frequency (i.e., w: |P(jw)C(jw) |= 1) is 0.8rad/s. What is the contribution of a constant unit disturbance to the output?
b. When $C(s) = K(Ts+1)/s$, design K,T so that the crossover frequency is 0.8rad/s and the phase margin (i.e., the difference between the loop angle and –180 at the crossover frequency, $\angle P(jw_c)C(jw_c)+180$) is at least 60^o. What is the contribution of a constant unit disturbance to the output?
Verify in MATLAB, using **step(feedback(P,K),feedback(P,C))**

Problem 3: (High Bandwidth Controller)
For the feedback system of Problem 1, suppose $P(s) = 1/(0.3s+1)$.

a. When *C(s) = K*, design K so that the loop crossover frequency (i.e., w: |P(jw)C(jw) |= 1) is 18rad/s. What is the contribution of a constant unit disturbance to the output?
b. When $C(s) = K(Ts+1)/s$, design K,T so that the crossover frequency is 18rad/s and the phase margin (i.e., the difference between the loop angle and –180 at the crossover frequency, $\angle P(jw_c)C(jw_c)+180$) is at least 60^o. What is the contribution of a constant unit disturbance to the output?
Verify in MATLAB, using **step(feedback(P,K),feedback(P,C))**