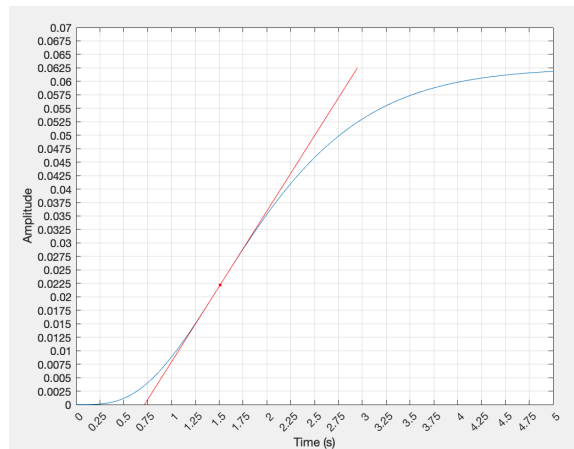


BME 444
HW 10 - Due Apr 26, 2022

1. Use the reaction curve method to estimate the K_P and K_I gains for a PI controller using the following reaction curve.



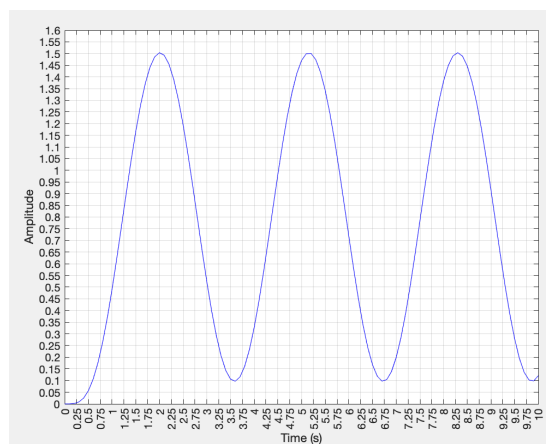
$$R = 0.028$$

$$T_d = 0.7177$$

$$K_P = 44.78$$

$$K_I = 18.72$$

2. Use the ultimate gain method to estimate K_P , K_I , and K_D gains for a PID controller. Assume the ultimate gain is $K = 64$.



$$K_U = 64$$

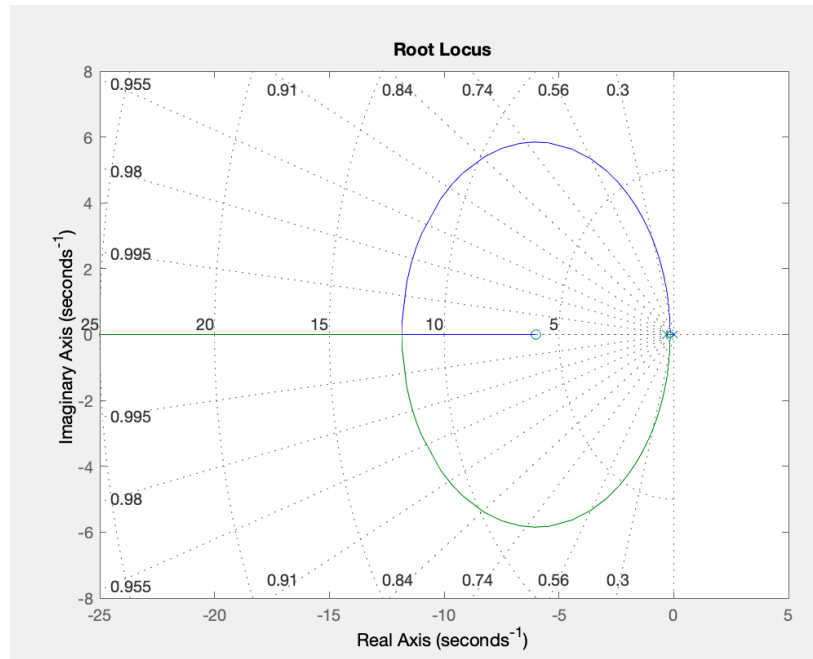
$$P_U = 3.2$$

$$K_P = 38.4$$

$$K_I = 24$$

$$K_D = 15.36$$

3. The root locus plot of a system is shown below. Is it possible to adjust the gain, K , of this system to achieve $\zeta = 0.74$ and $\omega_n = 10$ rad/sec? Why or why not?



No, it is not. The sgrid function shows that $\zeta = 0.74$ and $\omega_n = 10$ rad/sec lies outside the root locus plot.