MECH 467 - Tutorials 4 & 5 – Extra Examples

1) Given the following plant transfer functions, draw the bode plot.

(a) $$G_p(s) = \frac{100}{s(s+100)}$$

(b) $$G_p(s) = \frac{1000(s+100)}{s^2 + 10001s + 10000}$$

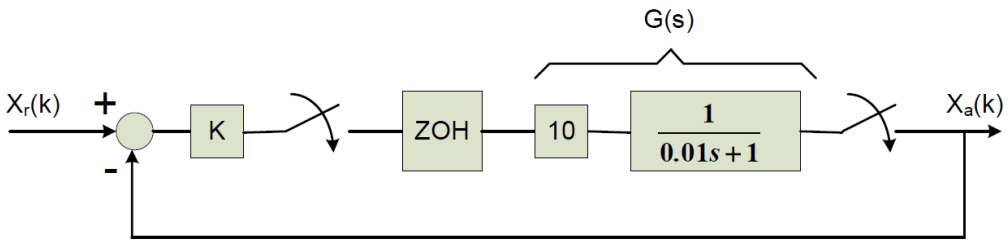

Fig. 1. Close loop control system of a discrete system

2) Obtain the zero-order hold equivalent of $G(s)$ with T_s = 1 ms.
3) Obtain the closed loop transfer function of the whole system in z-domain with K = 0.6.
4) Assuming X_r is a unit step input, calculate the response X_a at the first three sampling time periods ($X_a[T_s]$, $X_a[2T_s]$, $X_a[3T_s]$). Assume zero initial conditions.
5) Find the final value $X_{a,ss}$ and steady state error e_{ss} of the system subject to a unit step input.