

## Automatic Control – EEE 2002 Tutorial Exercise VI

1. Find the Closed Loop (CL) (with unity feedback, and  $G_c(s)=10$ ) Transfer Function (TF) when the Open Loop (OL) TF is:

- a.  $G_A = \frac{1}{s+1}$

- b.  $G_B = \frac{1}{s+s+1}$

- c.  $G_C = \frac{1}{(s+1)(s+s+1)}$

2. In each case find the CL pole and zero location.
3. Using the final value theorem find the steady state value of the CL response for a unit step and ramp input.
4. Find the error TF in each case.
5. Using the final value theorem find the steady state value of the error for a unit step and ramp input.
6. Using Simulink crosscheck your previous answer.
7. State the order and type of each system.
8. Find the error constants  $K_p$  and  $K_v$ .
9. Using the type and the error constants crosscheck your answer to Q5.
10. In each case increase the type of the system by 1 and repeat the previous steps.
11. In each case (AGAIN) increase the type of the system by 1 and repeat the previous steps.