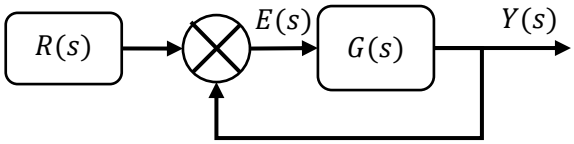
Misr University for Science and Technology
College of Engineering
Mechatronics Department

MTE 506 Digital Control
Sheet: 1
Due Date: *before* 29/03/2020

Sheet 1

Section 1: Final value theorem



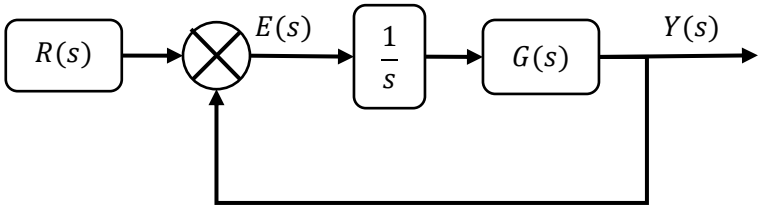
1. Based on your understanding of lab 3 tutorials:

If $G(s) = \frac{6}{(3s+0.12)(3s+0.06)}$

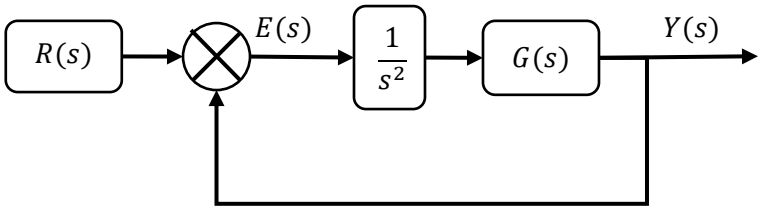
What is the steady state error if the excitation signal if :

I. $R(s)$ is a unit step
II. $R(s)$ is a ramp input
III. $R(s)$ is a parabolic input

2. If an integrator is added, repeat question 1 with all stated excitation signals



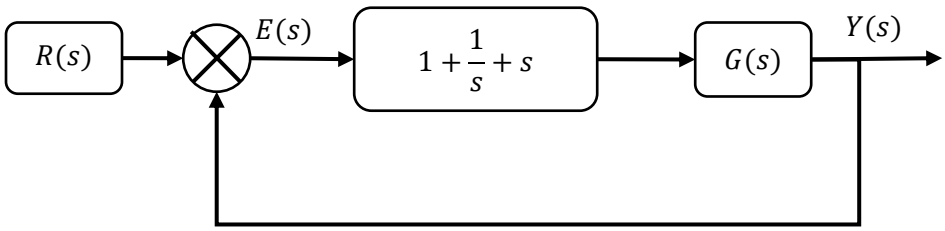
3. If another integrator is added, repeat question 1 with all stated excitation signals



Kindly write all the steps in your solutions sheet, then fill in the below table

$\boldsymbol{R(s)}$	$\boldsymbol{G(s)}$	$\boldsymbol{\frac{G(s)}{s}}$	$\boldsymbol{\frac{G(s)}{s^2}}$

4. Find the steady state error for the following PID controlled plant



Given: $G(s) = \frac{5}{s^2+7s+10}$, $G(s) = \frac{10}{0.3s+1}$

Section 2: System response of continuous system by Laplace transform

5. Find the inverse Laplace transform of the following systems
   I. $\frac{Y(s)}{R(s)} = \frac{2s-8}{s^2-5s+6}$, $R(s) = 1$
   II. $\frac{Y(s)}{R(s)} = \frac{2s-8}{s^2-5s+6}$, $R(s) = \frac{1}{s}$
   III. $\frac{Y(s)}{R(s)} = \frac{2s-8}{s^2-5s+6}$, $R(s) = \frac{1}{s^2}$

Solve all questions in detailed steps

Section 3: Computer exercises

Model the RC circuit as a function of time in the form:

$$\boldsymbol{v_c(t) = f(v_s(t), R, C, v_c(t - \Delta t))}$$

Where:

$v_s(t) \ldots source\ voltage$
$R \ldots resistence\ in\ ohms$
$C \ldots capacitance\ in\ farad$
$\Delta t \ldots stepping\ time$

Develop a MATLAB model, run it and include the result in your report.

Notes:

- **Use** Microsoft equations editor to write your answers**.**
- Don't share your answer with your colleagues to avoid discarding your report.
- Upload your report and code under folder **assignment 1 in your repository.**
- **MAKE** your repository **private** not **public** and invite me to it.