Automatic Control – EEE 2002 Tutorial Exercise II

1. Find a polynomial expression for:
   a. y'=-5
   b. y'+3y=1
   c. y'-0.1y=t
   d. y''+y'+6y=cos(t)
2. Find in time and s-domain the final value of the signals shown in question. Crosscheck your answers from Simulink and Matlab
3. By using Matlab find the TF of the following
   a. G_1 and G_2 are in parallel connection
   b. G_1 and G_2 are in series connection
   c. G_1 and G_2 are in series and this is in parallel with G_2 connection
   d. G_1 and G_2 are in parallel and this is in series with G_1 connection

   Where $G_1(s)=\frac{1}{s+2}$ and $G_2(s)=\frac{s+5}{s^2+3s+6}$

4. Find the order, zeros, poles and plot the results of

$$G_1(s)=\frac{1}{s+1},\ G_2(s)=\frac{2}{s+5},\ G_3(s)=\frac{s+13}{s^2+s+1}$$

$$G_4(s)=\frac{s-6}{(s+6)(s+1)},\ G_5(s)=\frac{s^2}{(s^2+1)(s-10)},\ G_6(s)=\frac{s^2+1}{s}$$

   Which system is stable and why?

5. Simplify the following block diagram