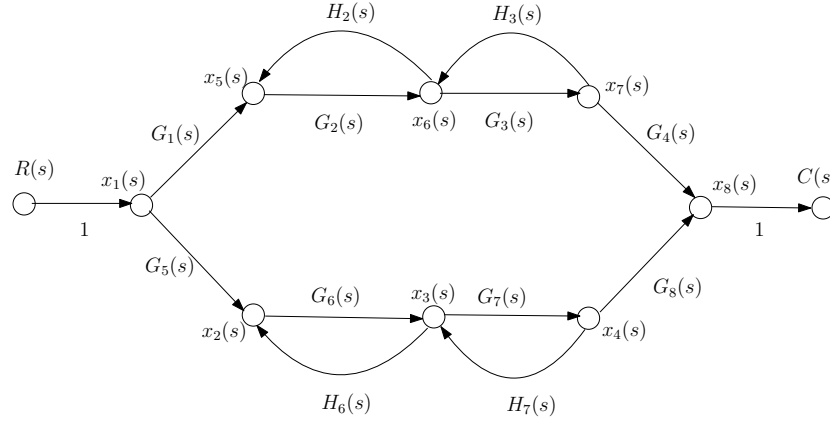
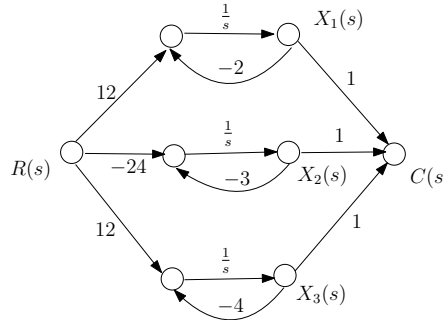


Tutorial #5

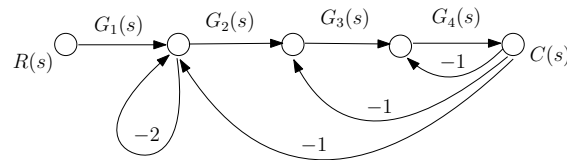
1. Signal flow graph of a control system is given in figure below. Derive the transfer function $\frac{C(s)}{R(s)}$ of the control system using Mason's gain formula.



2. Find the transfer function $\frac{C(s)}{R(s)}$ for the system represented in figure below using Mason's gain formula. Also provide a state space representation.



3. Find the transfer function $\frac{C(s)}{R(s)}$ for the system given below using Mason's gain formula. Verify the above result using the matrix approach.



4. Draw the signal flow graph for the following state space system.

$$\dot{\mathbf{x}}(t) = \begin{bmatrix} 0 & 1 & 0 \\ 0 & -3 & 1 \\ -3 & -4 & -5 \end{bmatrix} \mathbf{x}(t) + \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} u(t), \quad y(t) = [1 \ 2 \ 0] \mathbf{x}(t), \quad \text{where } \mathbf{x}(t) = \begin{bmatrix} x_1(t) \\ x_2(t) \\ x_3(t) \end{bmatrix}$$