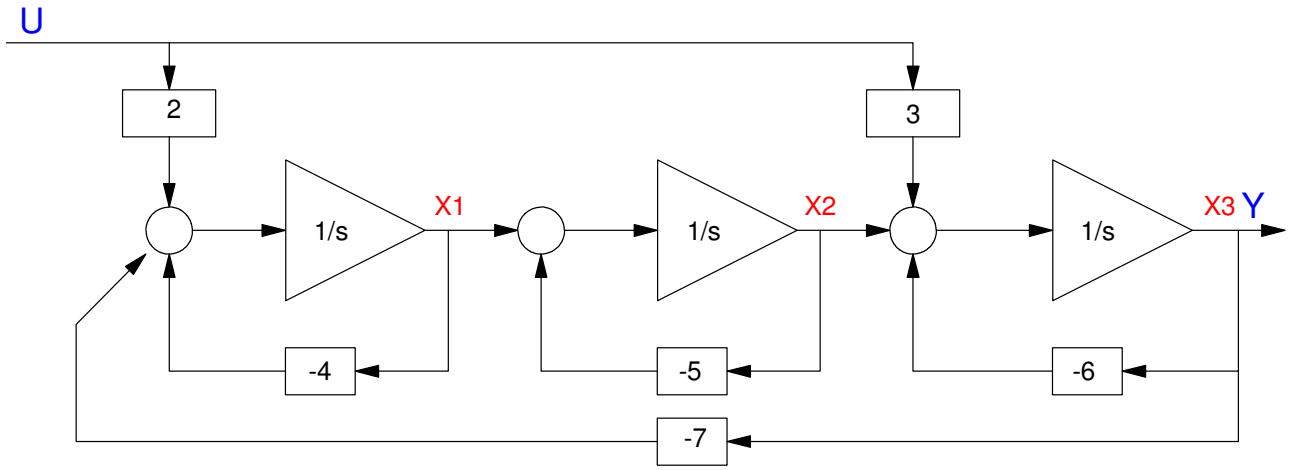
ECE 463/663 Handout #3

State Space

Express the following system in state-space form



Solution

$$sx_1 = 2U - 4x_1 - 7x_3$$

$$sx_2 = x_1 - 5x_2$$

$$sx_3 = 3U + x_2 - 6x_3$$

$$y = x_3$$

in matrix form

$$\begin{bmatrix} sx_1 \\ sx_2 \\ sx_3 \end{bmatrix} = \begin{bmatrix} -4 & 0 & -7 \\ 1 & -5 & 0 \\ 0 & 1 & -6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 2 \\ 0 \\ 3 \end{bmatrix}$$

$$y = \begin{bmatrix} 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$