

1. Convert the following to a transfer function

$$\dot{\mathbf{x}} = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix} \mathbf{x} + \begin{bmatrix} 5 \\ 6 \end{bmatrix} \mathbf{u}$$

$$\mathbf{y} = [7 \quad 8] \mathbf{x} + \mathbf{0u}$$

Ans:  $G(s) = \frac{83s + 18}{s^2 - 5s - 2}$

2. Convert the following to state space representation

$$G(s) = \frac{83s + 16}{s^2 - 5s - 2}$$

Ans :  $A = [0 \ 1; 2 \ 5]$

$B = [0; 1];$

$C = [16 \ 83];$

$D = 0;$