

**Problem 1**

Given a differential equation

$$\ddot{y} + 7\dot{y} - 16y + 3y + 12y = 2u - \dot{u} - 4\ddot{u}$$

Write down the transfer function  $\frac{Y(s)}{U(s)}$  and state space representation of the system.

$$\dot{x} = Ax + Bu$$

$$y = Cx + Du$$