



문제 3 Transfer function to canonical form

$$G(s) = \frac{Y(s)}{U(s)} = \frac{1}{s^3 + 10s^2 + 8s + 10}$$

$$Y(s) = \left(\frac{1}{s^3 + 10s^2 + 8s + 10} U(s) \right) = X(s)$$

$$Y(s) = 1 \cdot X(s)$$

$$X(s) = \frac{1}{s^3 + 10s^2 + 8s + 10} U(s)$$

$$X(s) (s^3 + 10s^2 + 8s + 10) = U(s)$$

$$\begin{bmatrix} \ddot{x} \\ \dot{x} \\ x \end{bmatrix} = \begin{bmatrix} -10 & -8 & -10 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} \ddot{x} \\ \dot{x} \\ x \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} U(s)$$

$$Y(s) = \begin{bmatrix} 1 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \ddot{x} \\ \dot{x} \\ x \end{bmatrix} + D \begin{bmatrix} U(s) \end{bmatrix}$$

1 가 아니라 $s^2 + 10s + 1$ 이라고

$$Y(s) = (s^2 + 10s + 1) X(s)$$

$$y\left(\frac{t}{T}\right) = \begin{bmatrix} 1 & 10 & 1 \end{bmatrix} \begin{bmatrix} \ddot{x} \\ \dot{x} \\ x \end{bmatrix} + b u$$