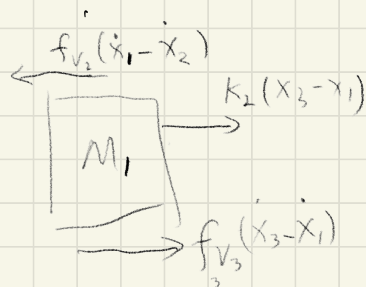
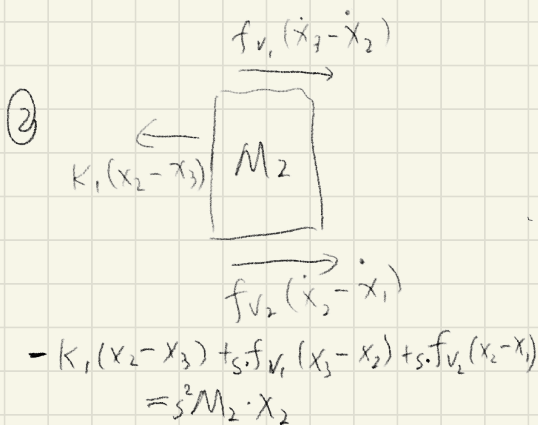
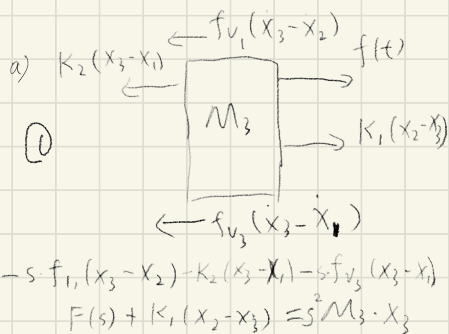
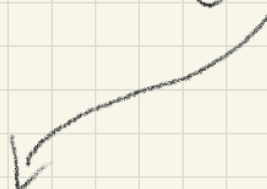


Q3



$\textcircled{3} -s f_{V2}(x_1 - x_2) + K_2(x_3 - x_1)$
 $+ s \cdot f_{V3} \cdot (x_3 - x_1) = s^2 M_1 x_1$

Solve ①, ②, ③



$$\begin{bmatrix} s^2+2s+1 & -s & -s-1 \\ -s & s^2+2s+1 & -s-1 \\ -s-1 & -s-1 & s^2+2s+2 \end{bmatrix} \begin{bmatrix} x_3 \\ x_2 \\ x_1 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} \cdot F = 0$$

$$\frac{Y(s)}{F(s)} = \frac{X_3(s)}{F(s)} = \frac{s^4 + 3s^3 + 3s^2 + 2s + \frac{1}{2}}{s^6 + 5s^5 + \frac{19}{2}s^4 + 8s^3 + 2s^2}$$

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

$$= \begin{bmatrix} 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & -2 & -8 & -\frac{11}{2} & -5 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \\ x_6 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 1 \end{bmatrix} F(s)$$

$\parallel$
 A

$\parallel$
 B

$$y = Cx + Du$$

$$C = \begin{bmatrix} 0 & 0 & -\frac{3}{2} & -6 & -\frac{13}{6} & -2 \end{bmatrix}$$

$$D = \begin{bmatrix} 1 \end{bmatrix}$$

c)

$$\frac{Y(s)}{F(s)} = \frac{s^4 + 3s^3 + 3s^2 + 2s + \frac{1}{2}}{s^6 + 5s^5 + \frac{19}{2}s^4 + 8s^3 + 2s^2}$$

