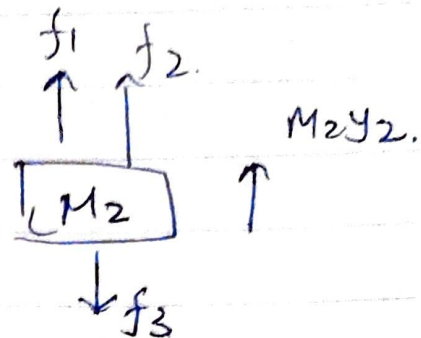
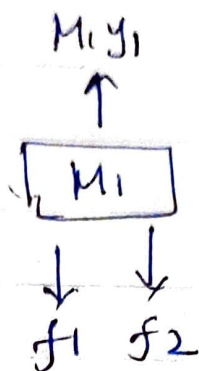
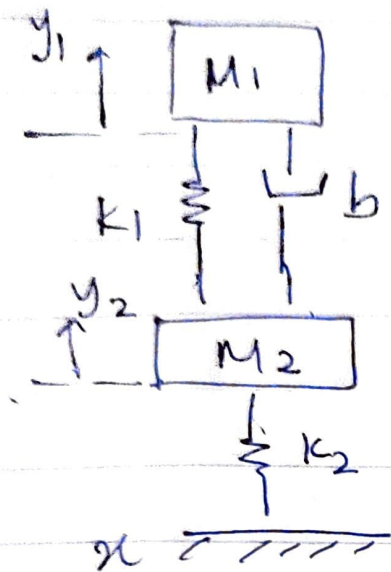


Week 1: Problem 2.

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Free body diagram.



$$f_1 = k_1(y_1 - y_2)$$

$$f_2 = b(y_1 - y_2)$$

$$f_3 = k_2(y_2 - x)$$

$$\therefore M_1 y_1 = -f_1 - f_2$$

$$M_1 \frac{d^2 y_1}{dt^2} = -k_1(y_1 - y_2) - b \left(\frac{dy_1}{dt} - \frac{dy_2}{dt} \right)$$

$$\therefore M_2 y_2 = f_1 + f_2 - f_3$$

$$\boxed{M_2 \frac{d^2 y_2}{dt^2} = k_1(y_1 - y_2) + b(y_1 - y_2) - k_2(y_2 - x)}$$