RW 13.10
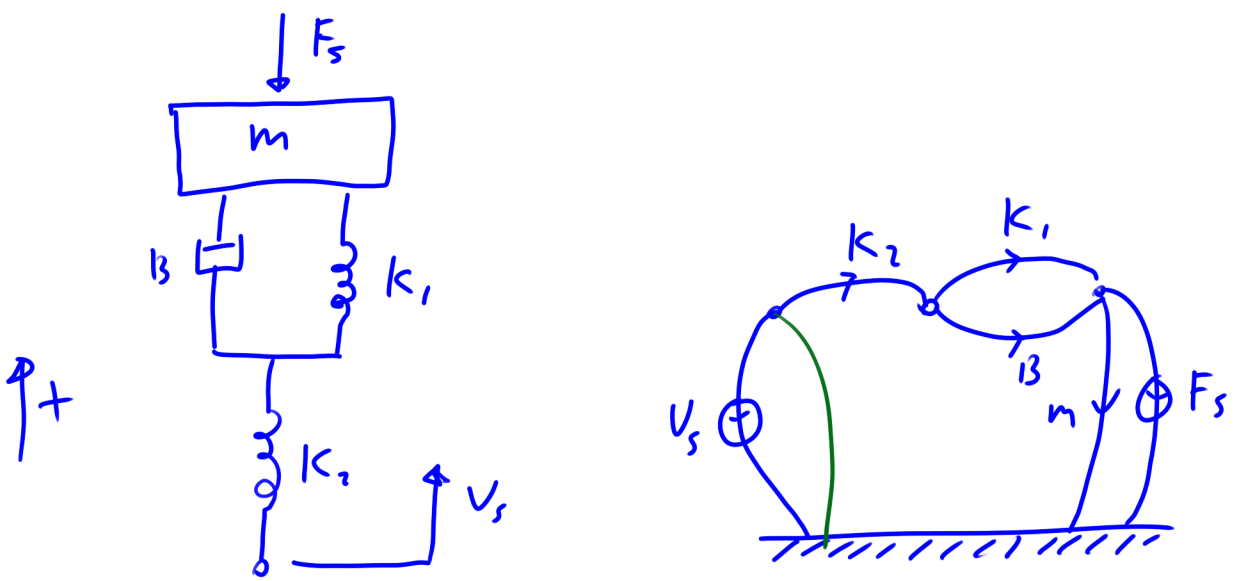
b)

$$\frac{V_m}{F_s}$$

$$F_m = \frac{1/Z_m}{1/Z_{KB} + 1/Z_m} F_s \qquad\qquad F_m = \frac{V_m}{Z_m}$$

$$\frac{V_m}{Z_m} = \frac{1/Z_m}{1/Z_{KB} + 1/Z_m} F_s$$

$$V_m = \frac{1}{1/Z_{KB} + 1/Z_m} F_s$$

$$Z_{KB} = Z_{K_2} + \frac{1}{1/Z_{K_1} + 1/Z_B}$$

$$= \frac{s}{k_2} + \frac{1}{k_1/s + B}$$

$$= \frac{s}{k_2} + \frac{s}{k_1 + B} = \frac{s k_1 + s B + s k_2}{k_2 k_1 + k_2 B}$$

$$V_m = \frac{1}{\frac{k_2 k_1 + k_2 B}{s k_1 + s B + s k_2} + ms} F_m$$

$$= \frac{s k_1 + s B + s k_2}{k_2 k_1 + k_2 B + k_1 m s^2 + B m s^2 + k_2 m s^2} F_m$$

$$\boxed{\frac{V_m}{F_m} = \frac{s k_1 + s B + s k_2}{k_2 k_1 + k_2 B + (k_1 + B + k_2) m s^2}}$$

$$\frac{V_m}{V_s} \qquad\qquad V_m = \frac{Z_m}{Z_{KB} + Z_m} V_s$$