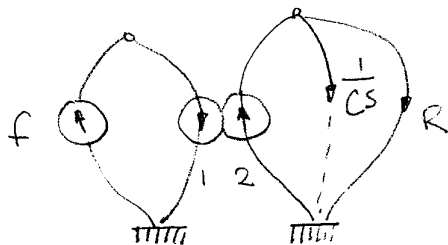


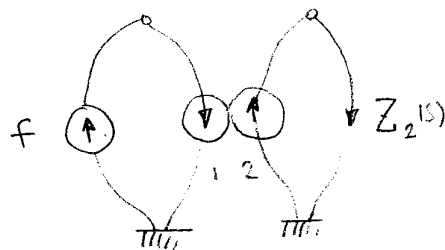
$$\begin{bmatrix} v \\ f \end{bmatrix} = \begin{bmatrix} 0 & \frac{1}{A} \\ A & 0 \end{bmatrix} \begin{bmatrix} p \\ Q \end{bmatrix}$$

(a)



$$\frac{1}{Z_2(s)} = \frac{1}{1/cs} + \frac{1}{R} = \frac{RCs+1}{R}$$

$$\Rightarrow Z_2(s) = \frac{R}{RCs+1}$$



$$Z(s) = (GY)^2 \cdot \frac{1}{Z_2(s)}$$

$$= \frac{RCs+1}{A^2 R}$$

(b) Transfer function from $v(t)$ to pressure $p(t)$

$$v(t) = V(s)e^{st} ; f(t) = F(s)e^{st}$$

$$p(t) = P(s)e^{st}$$

$$H(s) = \frac{P(s)}{V(s)} = \frac{1}{A} \cdot \frac{F(s)}{V(s)} = \frac{1}{A} \cdot \frac{1}{Z(s)}$$