HW C2: $\quad P = V^2/R$

$\qquad\qquad R = \rho L/A$

so $P \propto 1/(\rho L)$

$\rho,\ L$ — 2

$1.2\rho,\ 1.2L$ — 3

$0.8\rho,\ L$ — 1

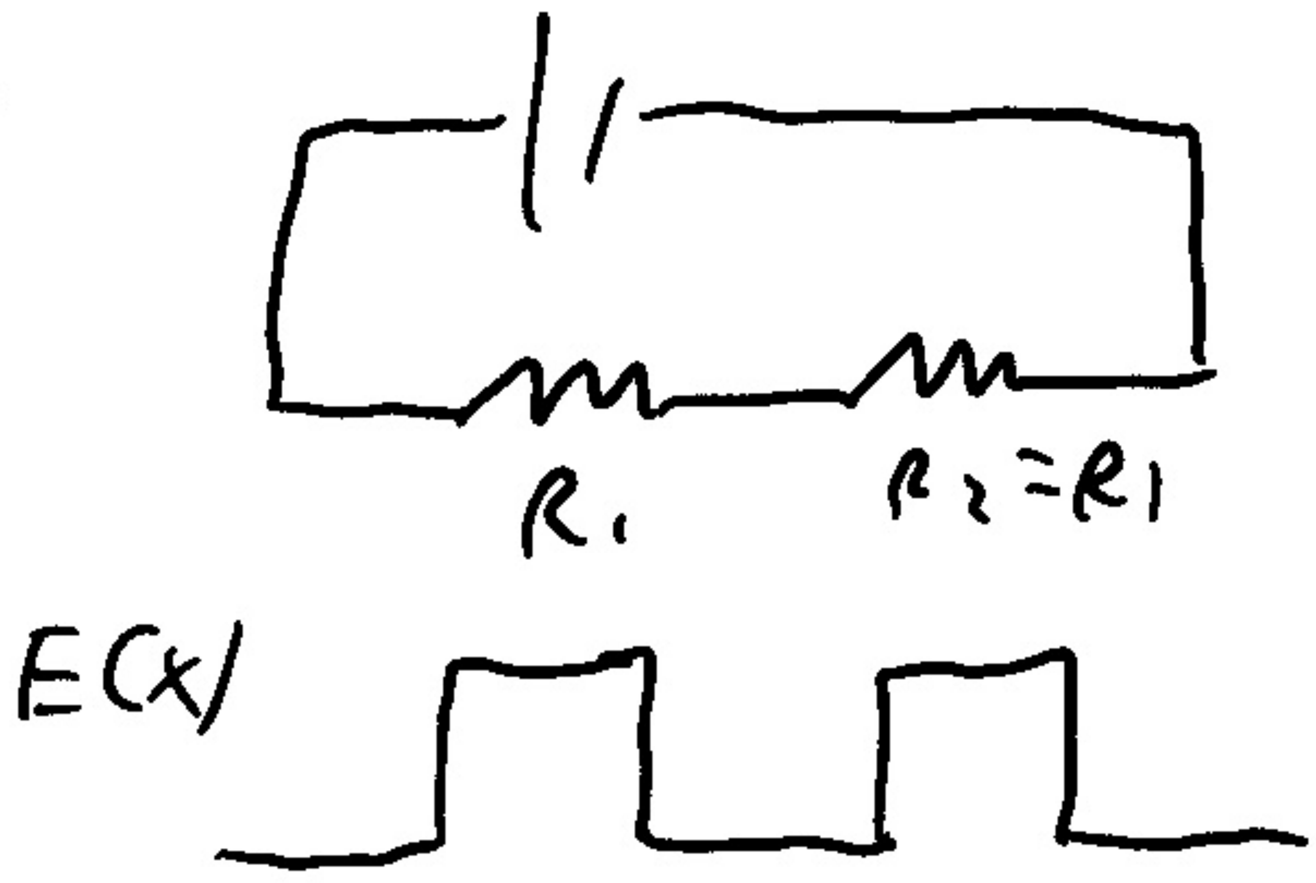
HW C3: $\quad I = V/R_{eq}$

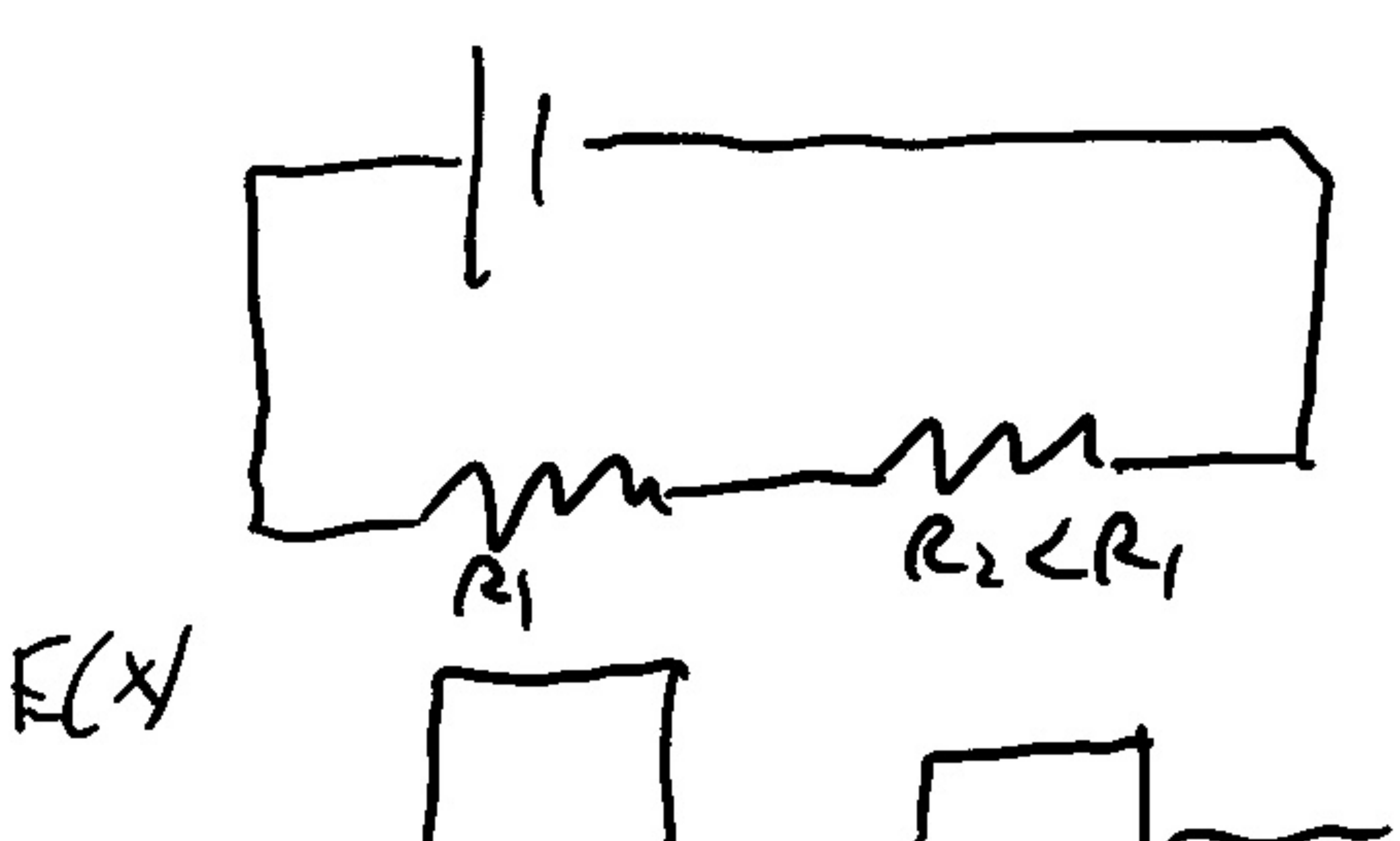
$R_{eq\text{-}par} = 1/(1/R_1 + 1/R_2)$

$R_{eq\text{-}ser} = R_1 + R_2$

$I_{parallel} > I_{R_2} > I_{series}$

HW C4:

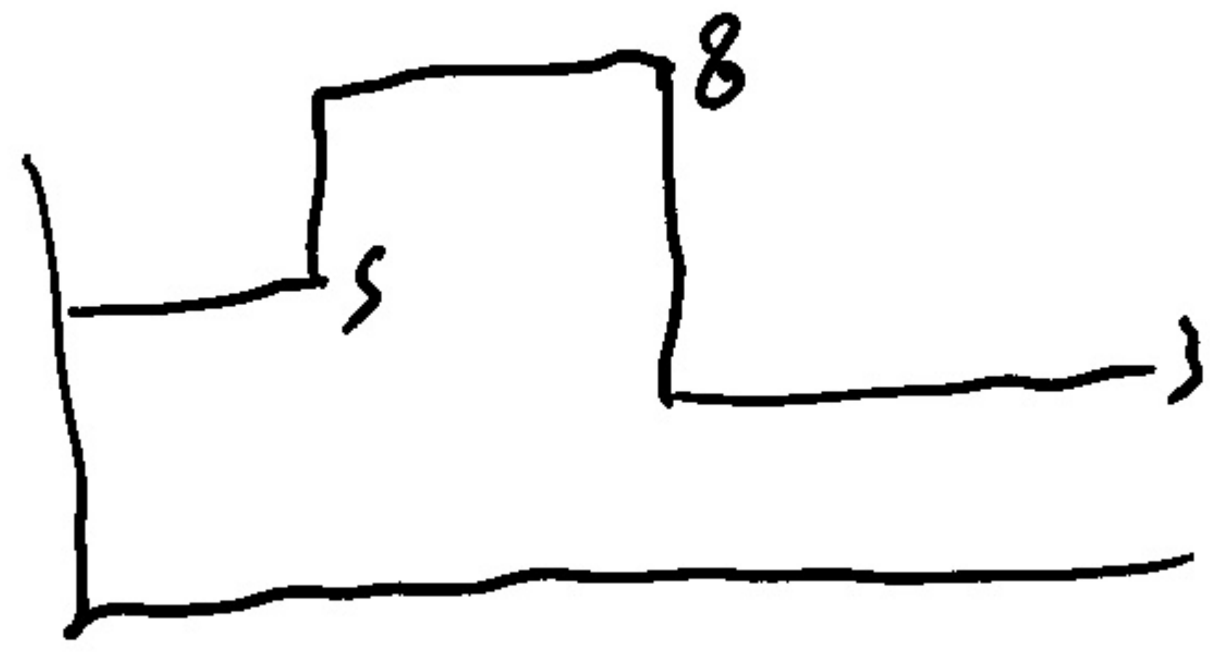




$$E = \rho J = \frac{RA}{L} J = RI/L$$

HWM1:

$E(x)$



— I same throughout

$I = JA$

$= EA/\rho = \text{const.}$

$\Rightarrow EA = E \cdot \pi r^2 = \text{const.}$

$\Rightarrow r_1 = r_3 \cdot \sqrt{E_3/E_1} = r_3 \sqrt{3/5}$

$r_2 = r_3 \cdot \sqrt{E_3/E_2} = r_3 \sqrt{3/8}$

HWM2: $R = \rho L/A$

$P = V^2/R = V^2 A/\rho L$

$I = V/R = VA/\rho L$

$\text{vol} = A \cdot L = \text{Const.} = Z$

$\Rightarrow A = Z/L$

$\Rightarrow P = V^2 Z/\rho L^2$

$I = VZ/\rho L^2$

$P/I = V \Rightarrow$ ratio of V's same as P/I

$$\rho = v^2 z / \rho L^2$$

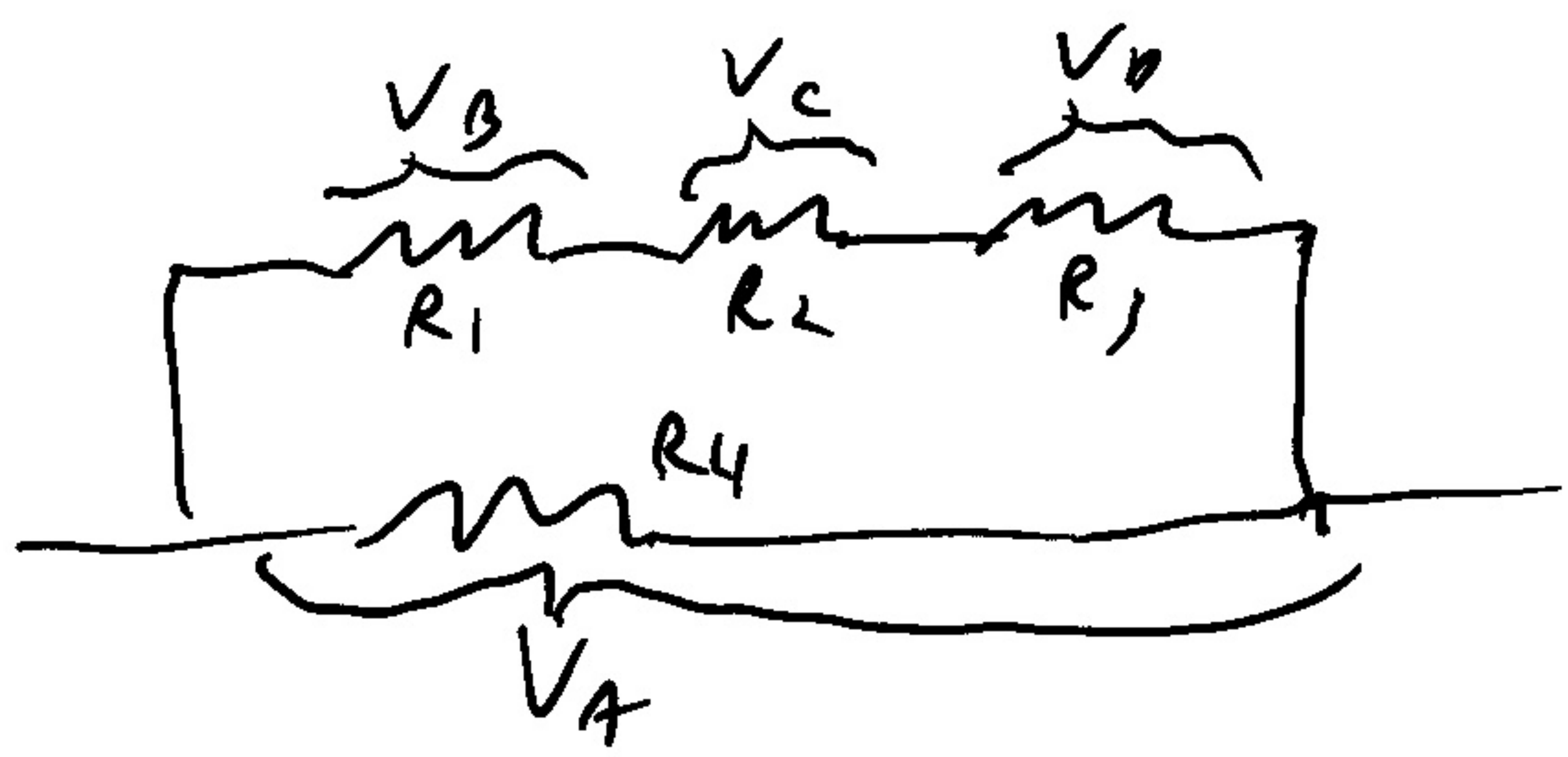
$$\Rightarrow \rho_2/\rho_1 = \frac{V_2^2}{V_1^2}\frac{L_1^2}{L_2^2}$$

$$\Rightarrow L_2/L_1 = \sqrt{\frac{V_2^2}{V_1^2}\frac{\rho_1}{\rho_2}}$$

since volume z = const.

$$A_2/A_1 = L_1/L_2$$

HWM3:



$$V_A = V_B + V_C + V_D$$

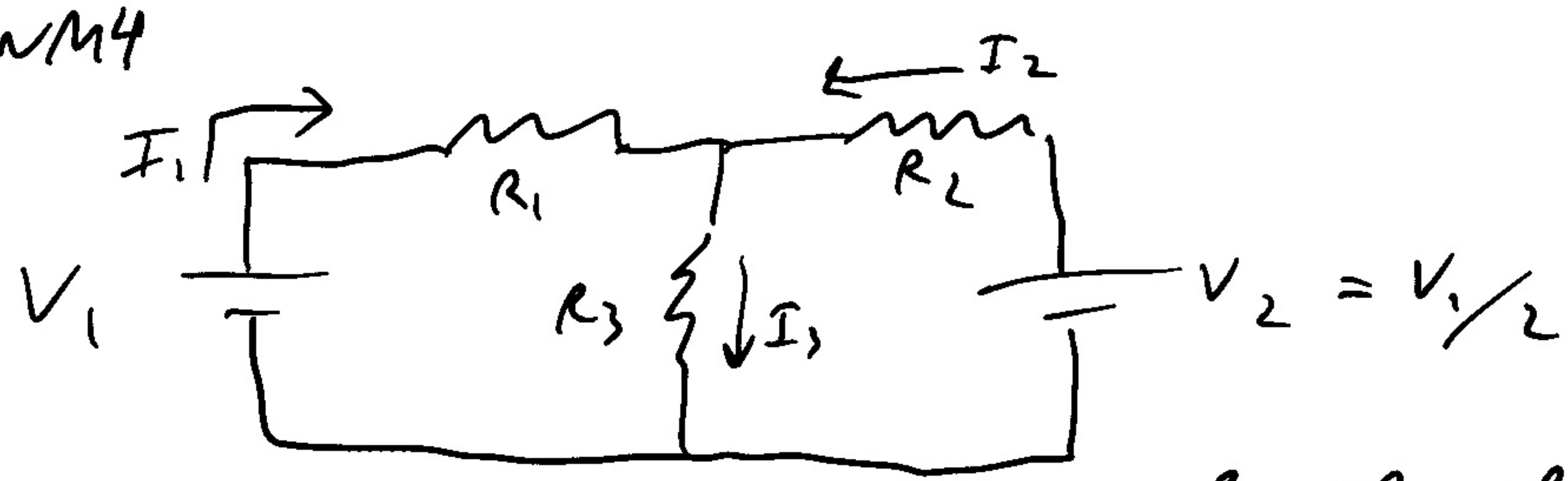
$$\Rightarrow V_D = V_A - V_B - V_C$$

$$I = V_D / R_3$$

$$R_1 = V_B / I$$

$$R_2 = V_C / I$$

HWM4



$R_1 = R_2 = R_3 = R$

$I_3 = I_1 + I_2$ Junction

$V_1 - I_1 R - I_3 R = 0$ Left

$V_2 - I_2 R - I_3 R = 0$ Right

$\Rightarrow V_1/2 - I_2 R - I_3 R = 0$

$I_2 = I_3 - I_1$

$\Rightarrow V_1/2 - I_3 R + I_1 R - I_3 R = 0$

or $V_1 + 2 I_1 R - 4 I_3 R = 0$

but $V_1 = I_1 R + I_3 R$ from right

$\Rightarrow 3 I_1 R - 3 I_3 R = 0$

$\Rightarrow I_1 = I_3 = I$

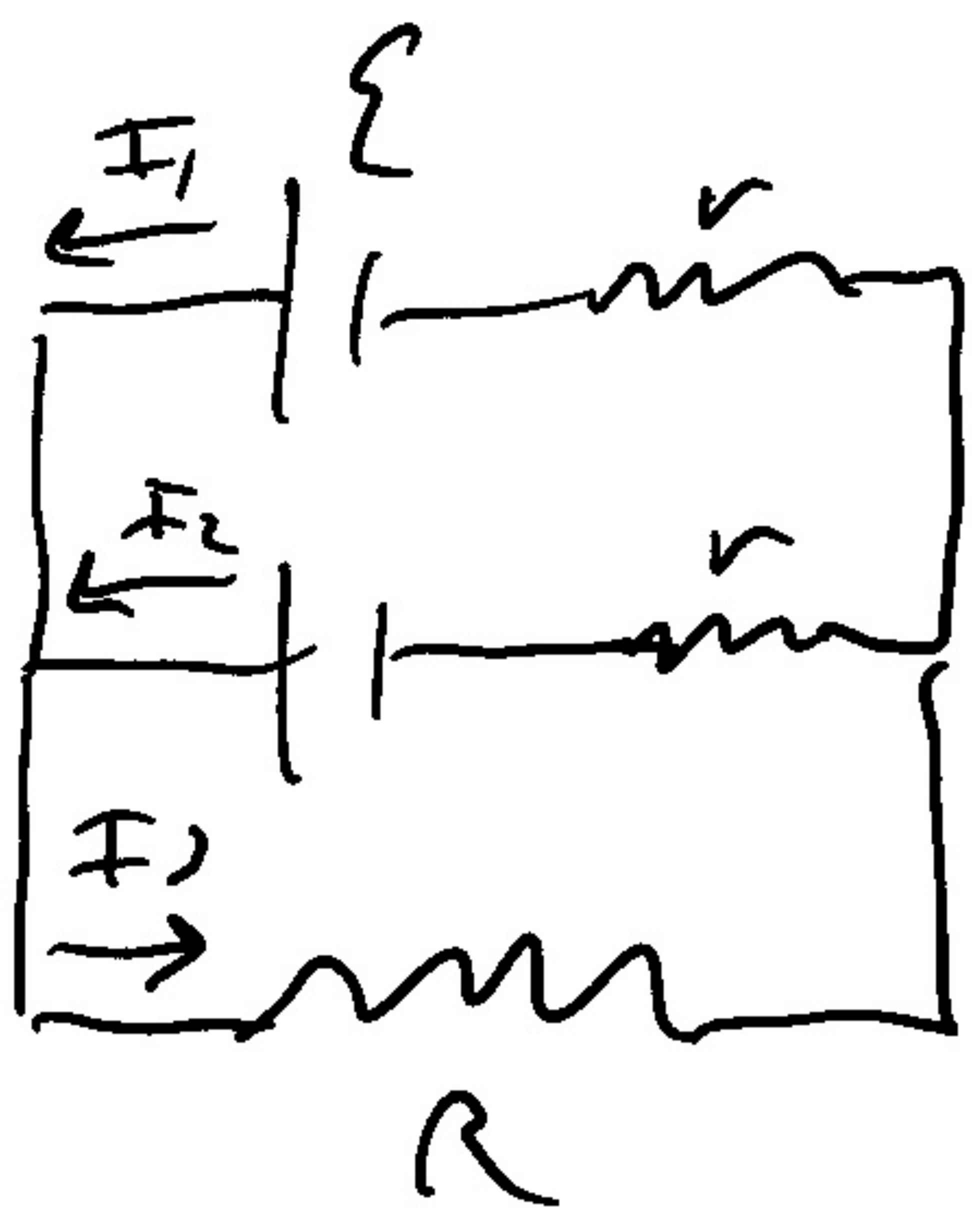
$\Rightarrow \boxed{I_2 = 0}$

$V_1 = I_1 R + I_3 R$

$= 2 I R$

$\Rightarrow I = V_1/2R$

HWMS



$$\mathcal{E} - I_1 r - I_3 R = 0$$

$$I_3 = I_1 + I_2$$

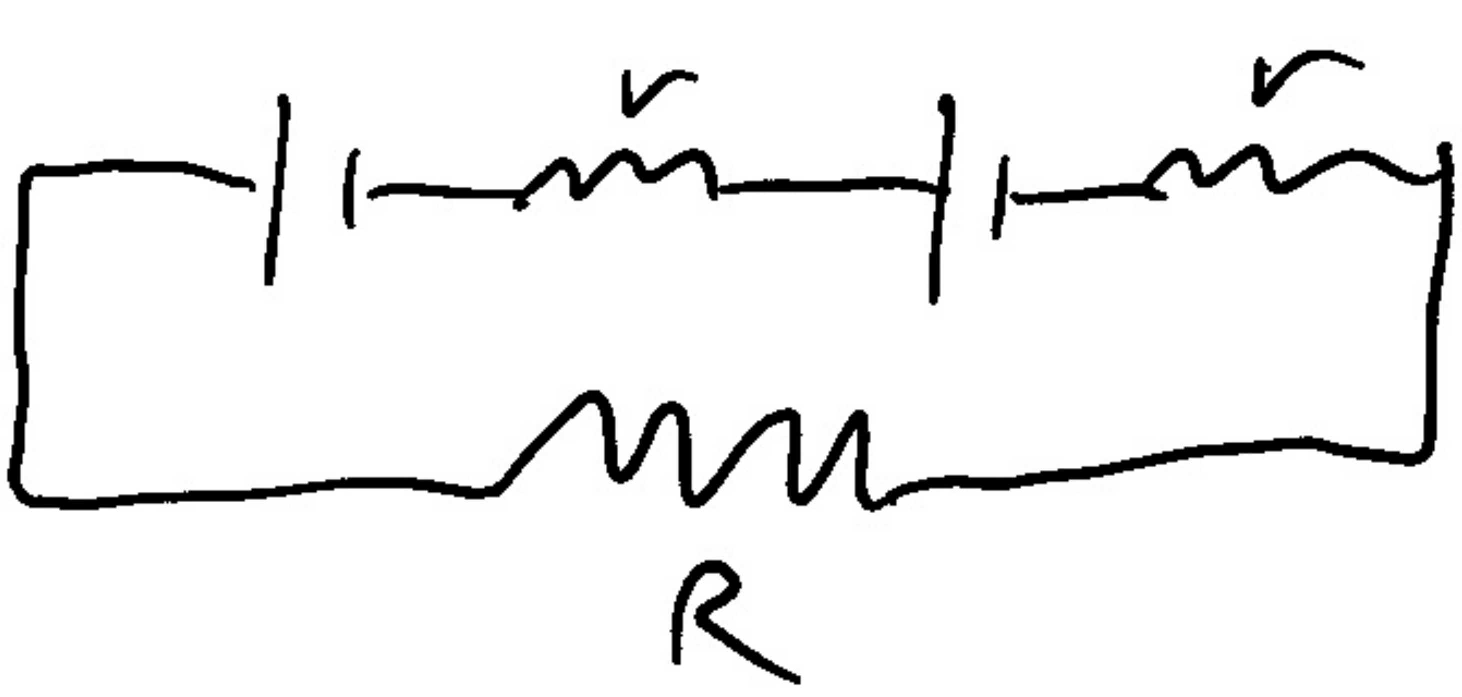
$$I_1 = I_2 \quad \text{by symmetry}$$

so $I_3 = 2 I_1$

so $\mathcal{E} - \frac{I_3}{2} r - I_3 R = 0$

$$\Rightarrow I_3 = \frac{\mathcal{E}}{r/2 + R}$$

$$= \frac{\mathcal{E}}{r/2 + 2r}$$



$$\mathcal{E} - Ir + \mathcal{E} - Ir - IR = 0$$

$$I = \frac{2\mathcal{E}}{2r + R} = \frac{\mathcal{E}}{2r}$$

bigger in series