① Phys 2425 2014.09-29

Exam 1 Wed 10/1

TI-84 $\sim I_1 + \sim I_2 + \sim I_3 = \sim$

Matrix → Edit → A → 4x3

$$\begin{bmatrix} \sim & \sim & \sim & \sim \\ & & & \end{bmatrix}$$

matrix of coefficients

Matrix → rref([A])

It returns

$$\begin{bmatrix} 1 & 0 & 0 & \sim \\ 0 & 1 & 0 & \sim \\ 0 & 0 & 1 & \sim \end{bmatrix}$$

↑ ± values

TI-89

solve({ ~x + ~y + ~z = ~, ~, ~}, x)

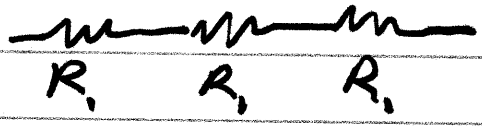
$P = IV = I^2R$

↳ $V = IR$

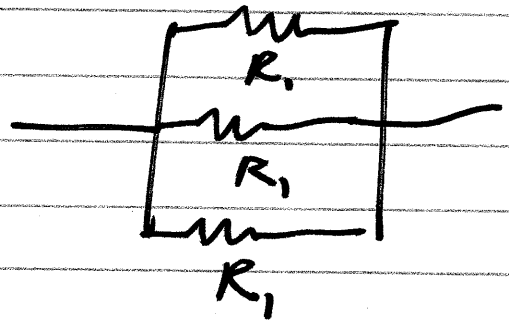
(2)

Cut a wire & place preces side-by-side

Initial: 

Cut preces 

$$R_1 = \frac{R_0}{N}$$

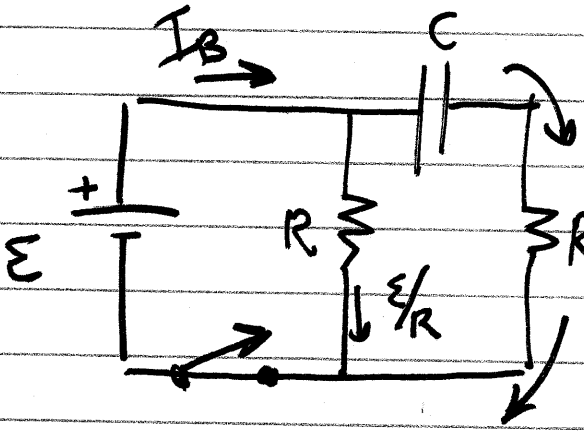
Place in parallel 

$$R_{eq} = \left(\frac{1}{R_1} + \dots\right)^{-1}$$

$$= \left(\frac{N}{R_1}\right)^{-1}$$

$$= \frac{R_1}{N}$$

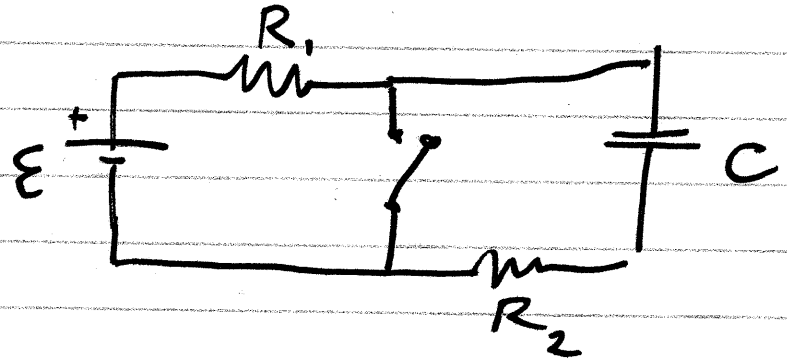
$$R_{eq} = R_0/N^2$$



$$V_B = V_C + V_R$$

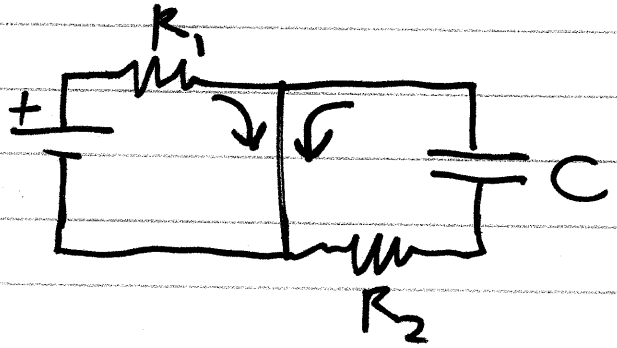
$$I = \begin{cases} \mathcal{E}/R & \text{initially} \\ 0 & \text{finally} \end{cases}$$

(3)



$$\mathcal{E} = V_1 + V_2 + V_C \qquad \tau = RC$$

$R_1 + R_2$



$$\mathcal{E} = R_1 I \qquad V_C = V_2 \quad (IR_2) \qquad \tau = RC$$

R_2

I in switch includes

$$I_{Batt} = I_1 = \mathcal{E}/R_1$$

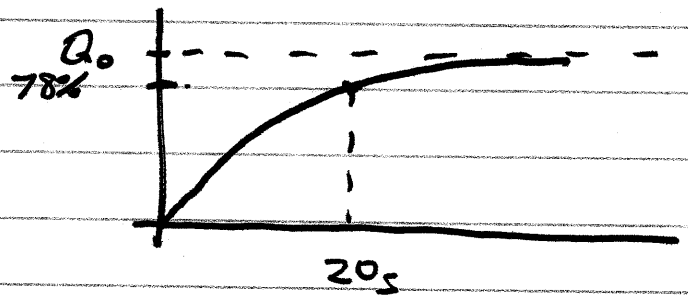
-and-

$$I_C = I_0 e^{-t/\tau} = \frac{V_0}{R_2} e^{-t/\tau}$$

$$\sim + \sim e^{\wedge}(-t/\sim)$$

(4)

Reach 78% of full charge in 20 s.



$$V = V_0\left(1 - e^{-t/\tau}\right)$$

$$\frac{V}{V_0} = 1 - e^{-t/\tau}$$

% Complete = 100% − % incomplete

$$e^{-t/\tau} = 0.22$$

$$-t/\tau = \ln(0.22) = -1.51$$

$$t = 1.51\,\tau$$

(20 s) is 1.51 time constants

$$\tau = \frac{20\,s}{1.51}$$

$$R = \rho\frac{l}{A} \qquad A = \pi r^2 \qquad r = d/2$$

$$\rho = \frac{RA}{l}$$

$$(15\,V) - (7\,\Omega)I_1 - (5\,\Omega)(2.82\,A) = 0$$