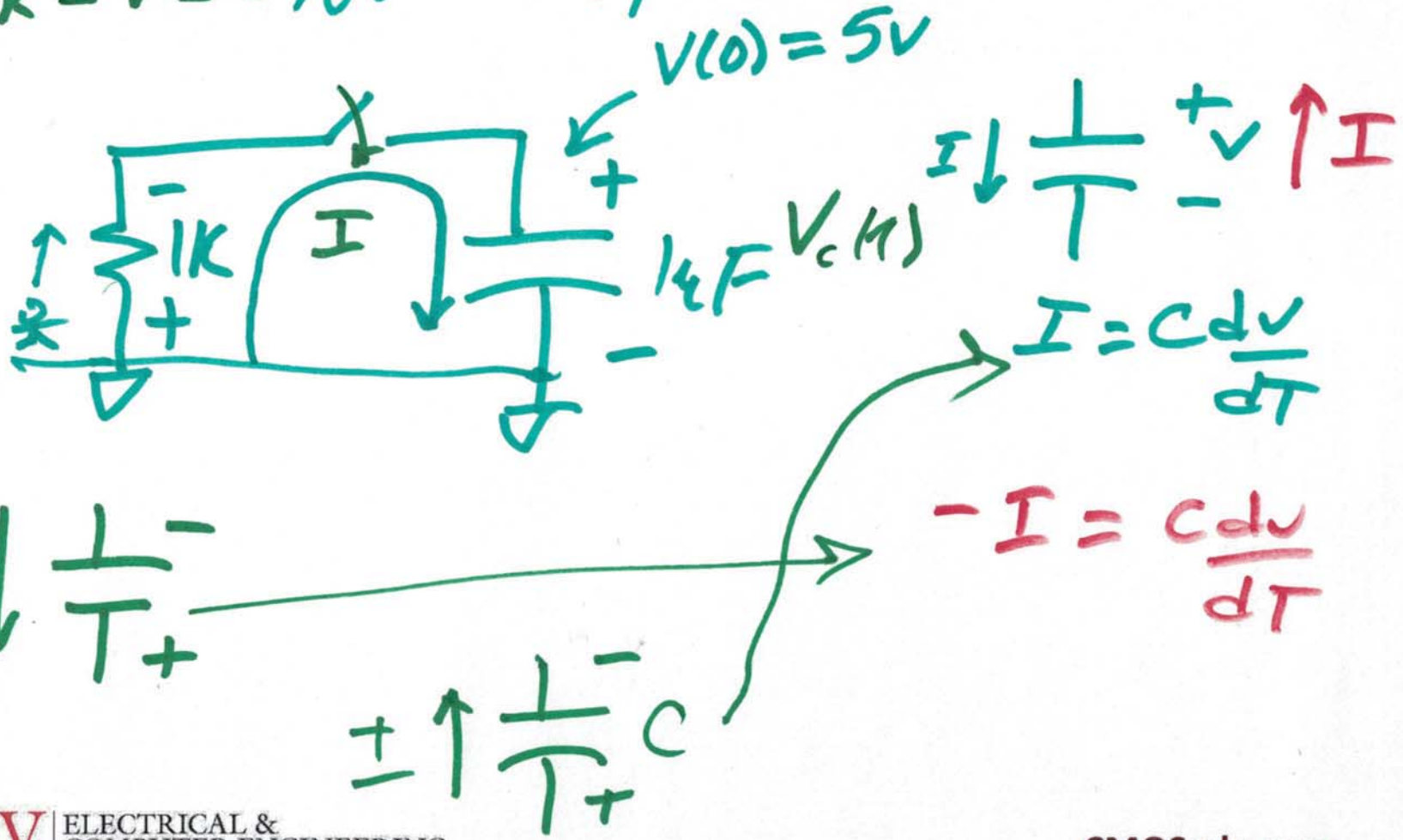
EE 220 Circuits 1

Lecture 20

NOV. 8, 2017

$-I \cdot 1K - V = 0$



$$-I \cdot 1K - V = 0, \qquad I = C\frac{dV}{dT}$$

$$0 = -\dot{I} \cdot 1K - \frac{1}{10^{-6}} \int_{5}^{v_c(t)} I \cdot dt \qquad V = \frac{1}{C} \int_{5V}^{v_c(t)} I \cdot dt$$

Come back

$$-I \cdot 1K - V = 0$$

$$RC$$

$$-1K \cdot 10^{-6} \cdot \frac{dv}{dt} - V = 0$$

$$\frac{v_c(t)}{5} = e^{-t/10^{-3}}$$

$$v_c(t) = 5e^{-t/10^{-3}}$$

$$\ln x \Big|_5^{v_c(t)} \qquad \ln \frac{v_c(t)}{5} \qquad -10^{-3} \cdot \frac{dv}{dT} = V$$

$$\int_5^{v_c(t)} \frac{dv}{V} = \int_0^t \frac{dt}{-10^{-3}} = \frac{-t}{10^{-3}}$$

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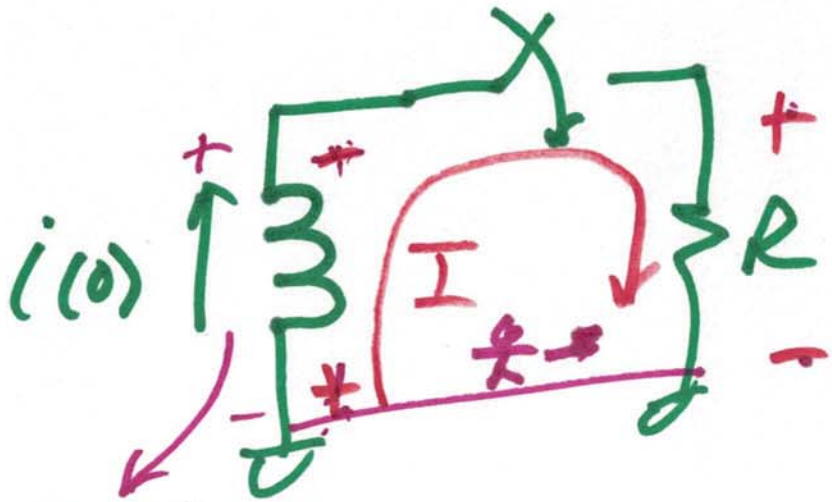
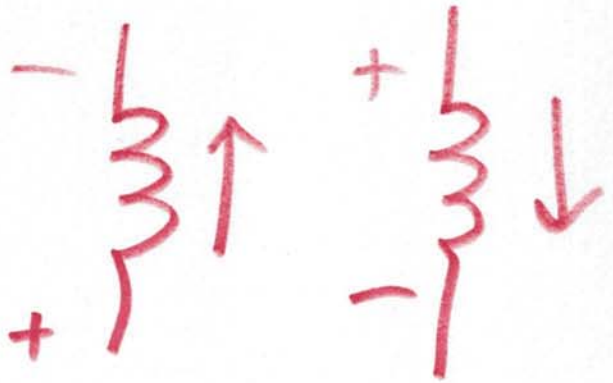
2) $\ln v_c(t) - \ln 5$





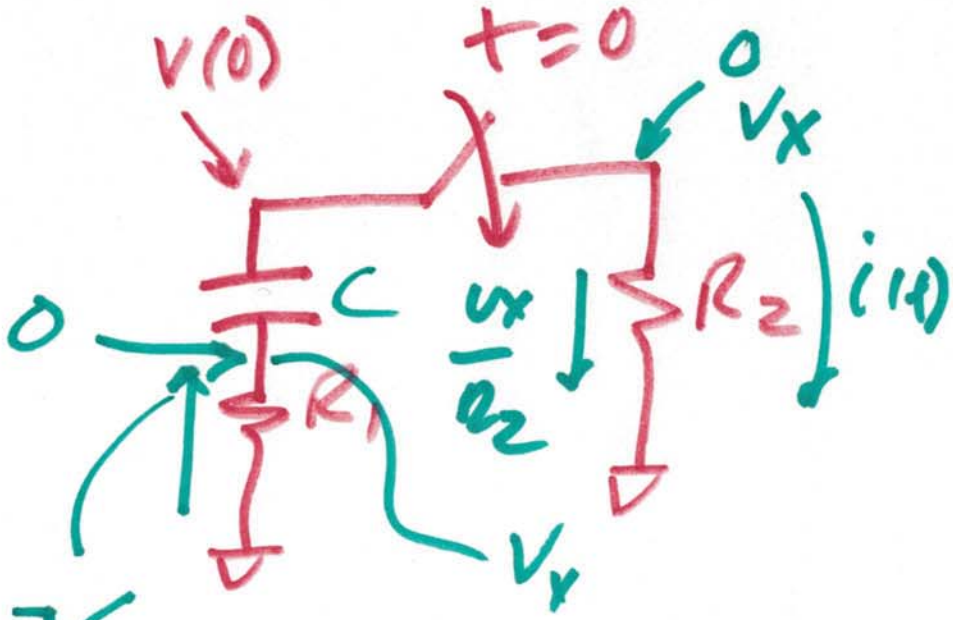
$$V_L(t) = L \cdot \frac{d\,I(t)}{dT}$$

$$V_L(t) = R \cdot I(0^-) e^{-t/\tau_R}$$

$$I(t)\cdot R + V_L(t) = 0 = I(t)\cdot R + L \cdot \frac{d\,I(t)}{dt}$$

$$-t/\tau_R = -\frac{R}{L}\cdot\int_0^t dt = \int_{I(0)}^{I(t)} \frac{dI}{I}$$

$$I(t) = I(0^-) e^{-t/\tau_R}$$



$$\tau = C \cdot (R_1 + R_2)$$

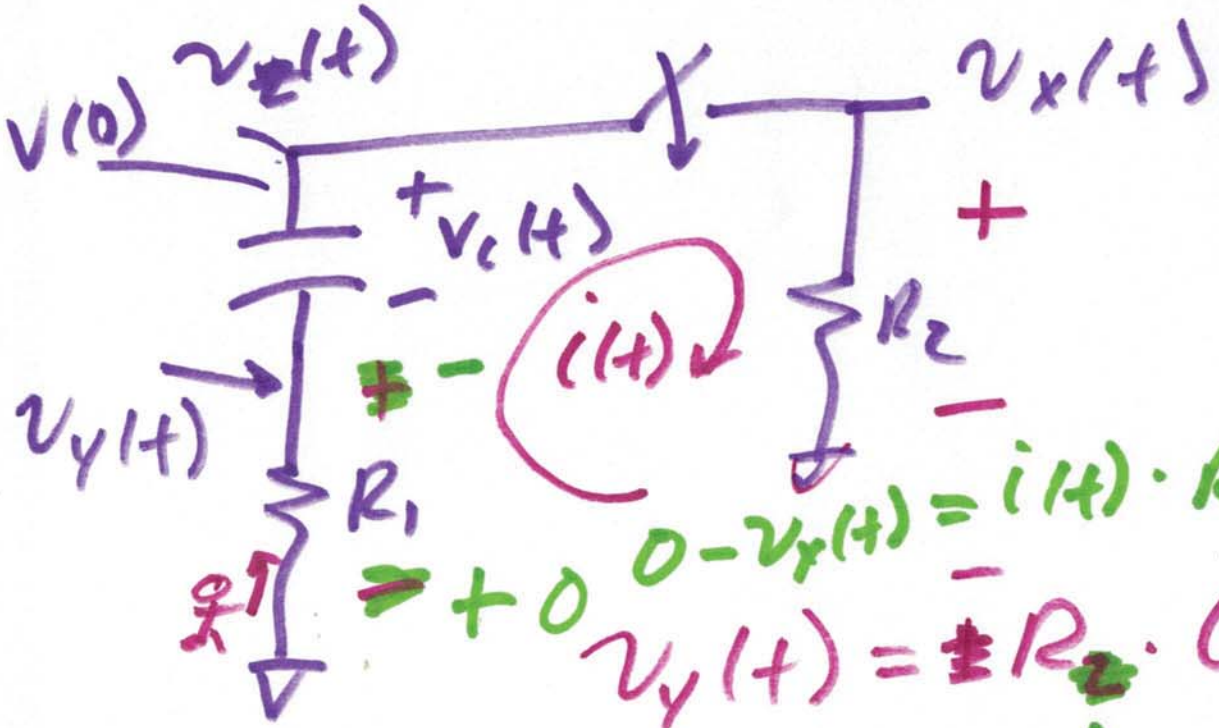
$$i(t) = \frac{V(0^-)}{R_1 + R_2} e^{-t/\tau}$$

$$I(0^+) = \frac{V(0^-)}{R_1 + R_2}$$

$$V_x = V(0^-) \frac{R_2}{R_1 + R_2} e^{-t/\tau}$$

$$V_y = -V(0^-) \cdot \frac{R_1}{R_1 + R_2} e^{-t/\tau}$$

$$-\frac{V_y}{R_1} = \frac{V_x}{R_2}$$



$$-i(t) = C\frac{dv_c(t)}{dt}$$

$$v_x(t) = R_2 \cdot i(t)$$

$$0 - v_x(t) = i(t) \cdot R_2$$

$$v_y(t) = \pm R_2 \cdot i(t)$$

$$v_y(t) + v_c(t) - v_x(t) = 0$$

$$-R_2 \cdot i(t) + v_c(t) - i(t) \cdot R_2 = 0$$

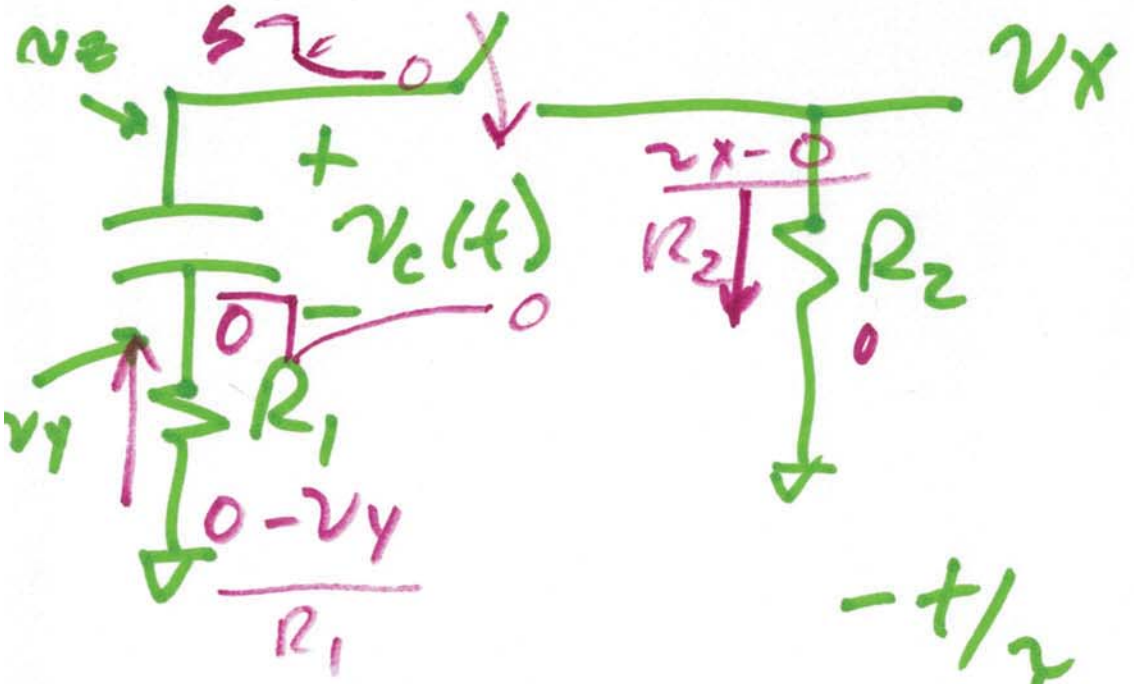
$$v_c(t) = V(0) \cdot e^{-t/T}$$

$$-R_1 \cdot i(t) + v_c(t) - i(t) \cdot R_2 = 0$$

$$-(R_1 + R_2)C\frac{dv_c(t)}{dt} = v_o(t)$$

$$T$$

5)

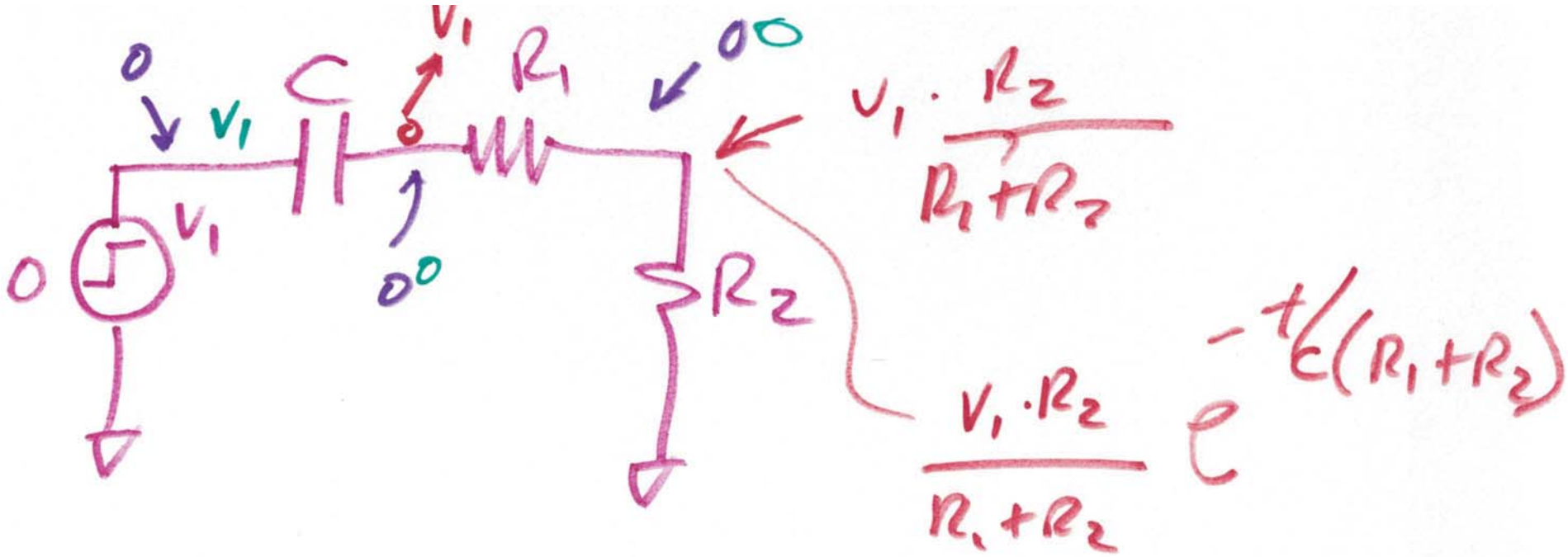


$$i(0) = \frac{v_x}{R_2} = \frac{-v_y}{R_1}$$

$$v_c(t) = V(0)\, e^{-t/\tau} = v_x - v_y$$

$$i(t) = C\frac{dv_c(t)}{dt} = C \cdot \left(\frac{V(0)}{C(R_1+R_2)}\right) \cdot e^{-t/\tau}$$

$$i(t) = \frac{V(0)^-}{R_1+R_2} \cdot e^{-t/\tau}$$


0
V_1
C
V_1
R_1
0
0
V_1
0
0
R_2
$V_1 \cdot \frac{R_2}{R_1+R_2}$
$\frac{V_1 \cdot R_2}{R_1+R_2}$
$e^{-t/\epsilon(R_1+R_2)}$