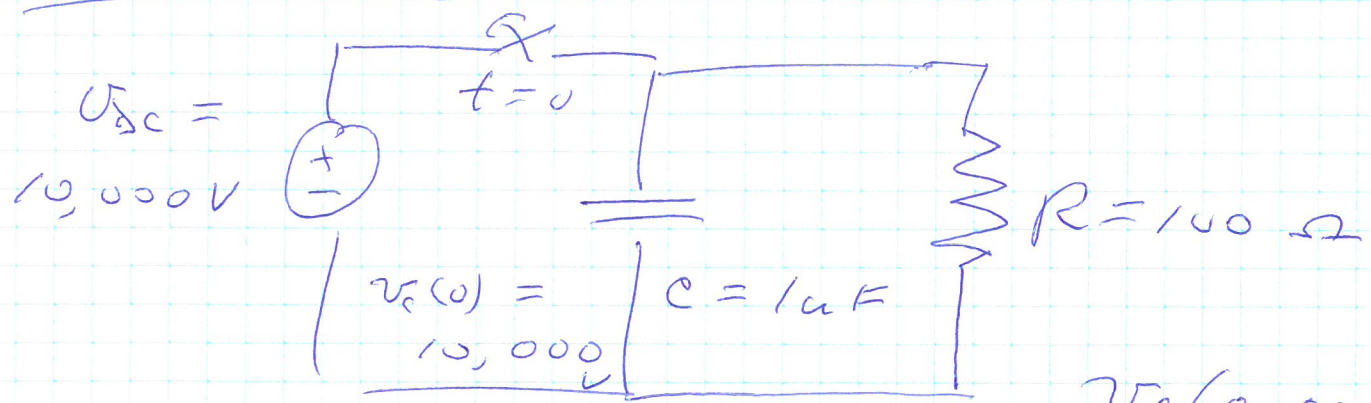


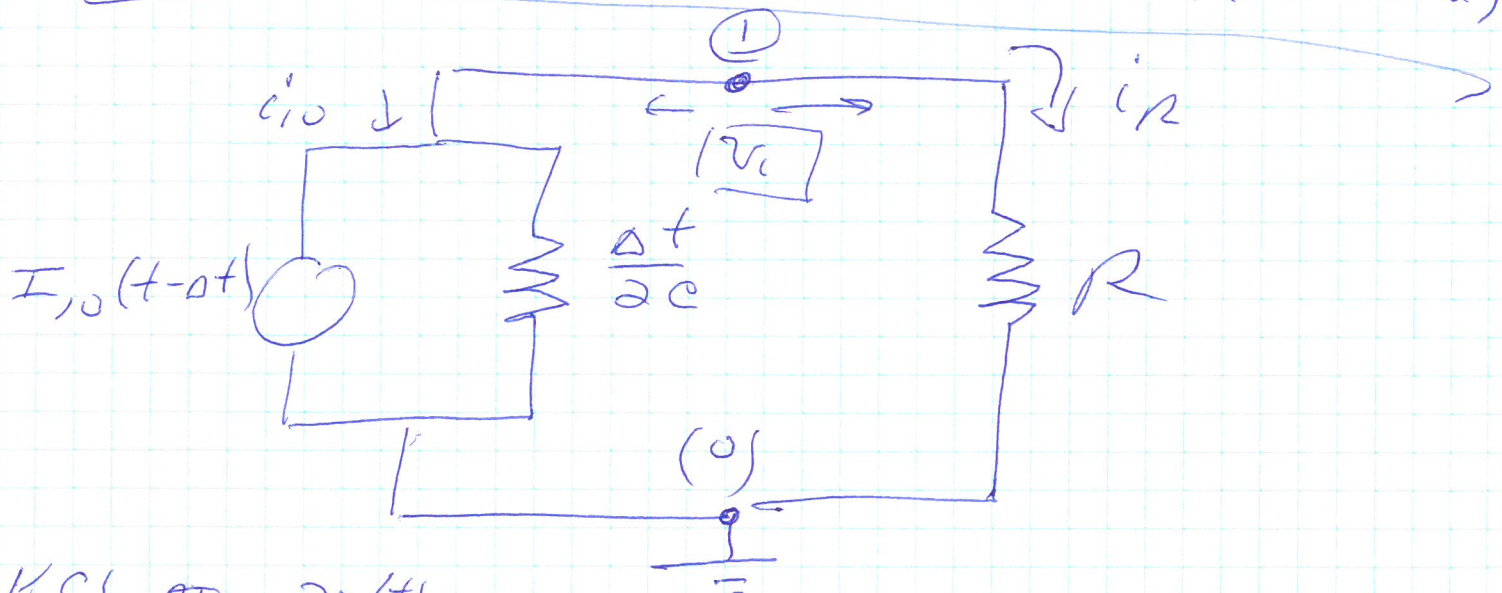
ECE 587
FALL 2019

ISAP EXAMPLE

19/11/19 1/2



$\Delta t = 10^{-5} = 0.00001$ Find:
 $v_c(0.00001)$
 $v_c(0.00002)$



KCL at ①

$$\frac{v_i(t)}{\frac{\Delta t}{2C}} + I_0(t-\Delta t) + \frac{v_i(t)}{R} = 0$$

$$\left(\frac{2C}{\Delta t} + \frac{1}{R}\right) v_i(t) = -I_0(t-\Delta t)$$

$$I_0(t-\Delta t) = -\dot{q}_0(t-\Delta t) - \frac{2C}{\Delta t} v_i(t-\Delta t)$$

$$\Delta t = 10^{-5}, C = 1.0 \times 10^{-6}, R = 100$$

$$v_c(0) = 10,000 \text{ V}$$

$$i_R = \frac{10,000}{100} = 100 \text{ A} \quad i_0(0) = -i_R(0) = -100 \text{ A}$$

ITERATION #1 EMIR EXAMPLE

2/2

$$\Delta t = 10^{-5}$$

$$I_{10}(0) = -i_{10}(0) - \frac{\partial c}{\Delta t} v_1(0)$$

$$= 100 - \frac{2 \times 10^{-6}}{10^{-5}} (10,000) = \underline{-1900 A}$$

$$v_1(\Delta t) = \frac{-I_{10}(0)}{\left(\frac{\partial c}{\Delta t} + \frac{1}{R}\right)} = \frac{1900}{\frac{2 \times 10^{-6}}{10^{-5}} + \frac{1}{100}} = \underline{9048 V}$$

$$i_{10}(\Delta t) = I_{10}(0) + \frac{v_1(\Delta t)}{\Delta t / \partial c}$$

$$= -1900 + \frac{9048}{(10^{-5} / 2 \times 10^{-6})} = \underline{-904 A}$$

$t = 2\Delta t = 2 \times 10^{-5}$ 2ND ITERATION

$$I_{10}(\Delta t) = -i_{10}(\Delta t) - \frac{\partial c}{\Delta t} v_1(\Delta t)$$

$$= 90.4 - \frac{2 \times 10^{-6}}{10^{-5}} (9048) = \underline{-1719.2 A}$$

$$v_1(2\Delta t) = \frac{-I_{10}(\Delta t)}{\frac{\partial c}{\Delta t} + \frac{1}{R}} = \frac{1719.2}{0.021} = \underline{8187 V}$$