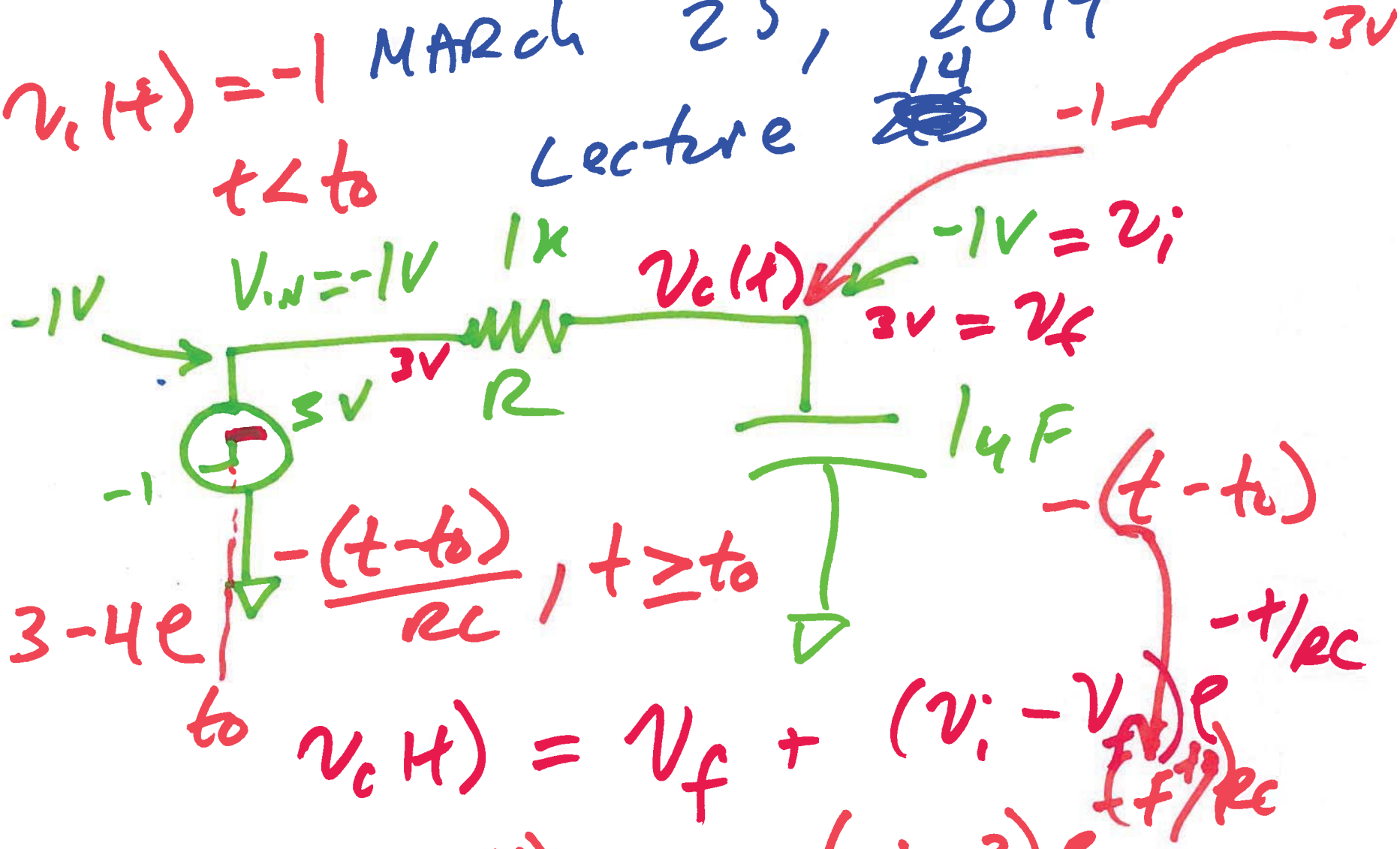
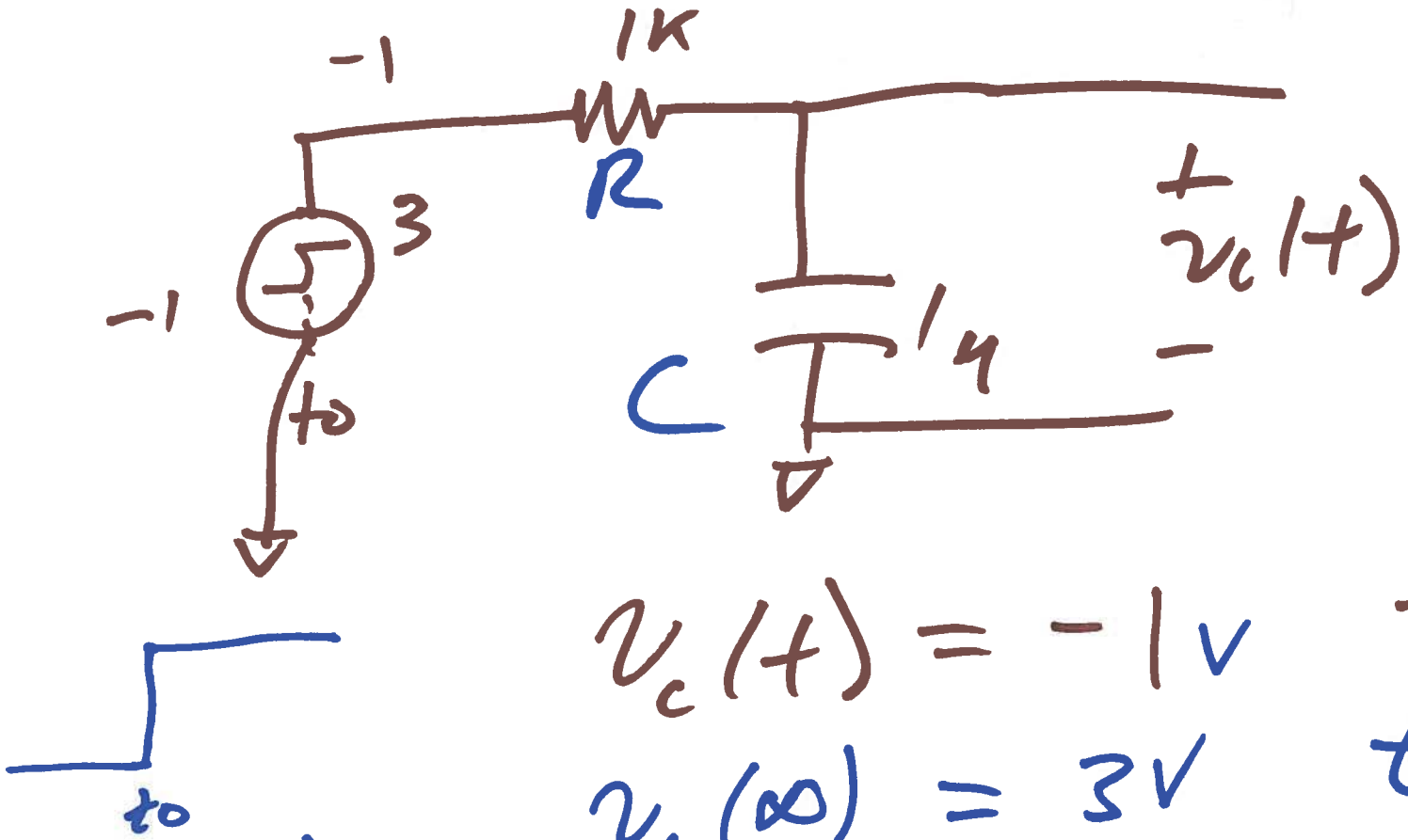
EE 221 Circuits II

MARCH 25, 2019

Lecture ~~14~~





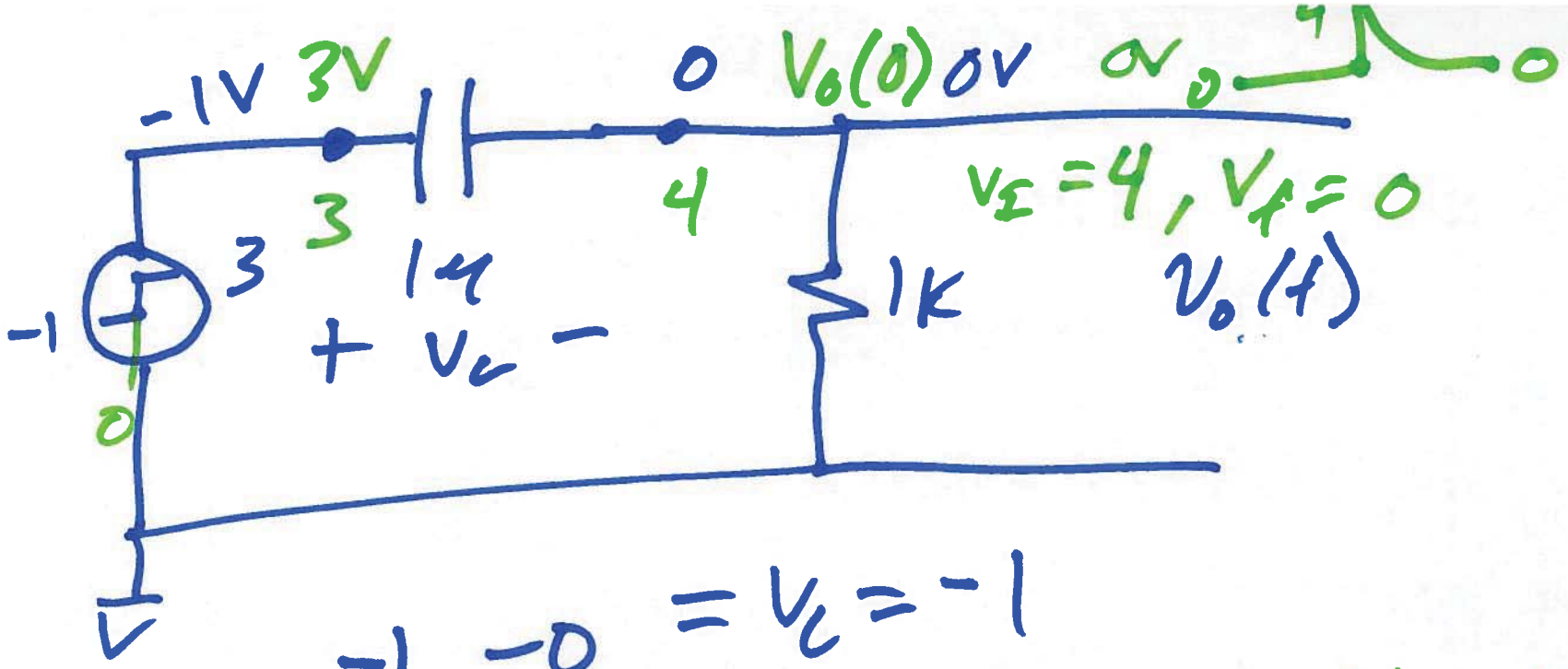
$v_c(t) = -1V \quad t < t_o$

$v_c(\infty) = 3V \quad t >> t_o$

$u(t-t_o)$

$v_c(t) = 3 + (3-1-3)e^{-(t-t_o)/RC} \quad t > t_o$

$= 3 - 4e^{-t/RC}$

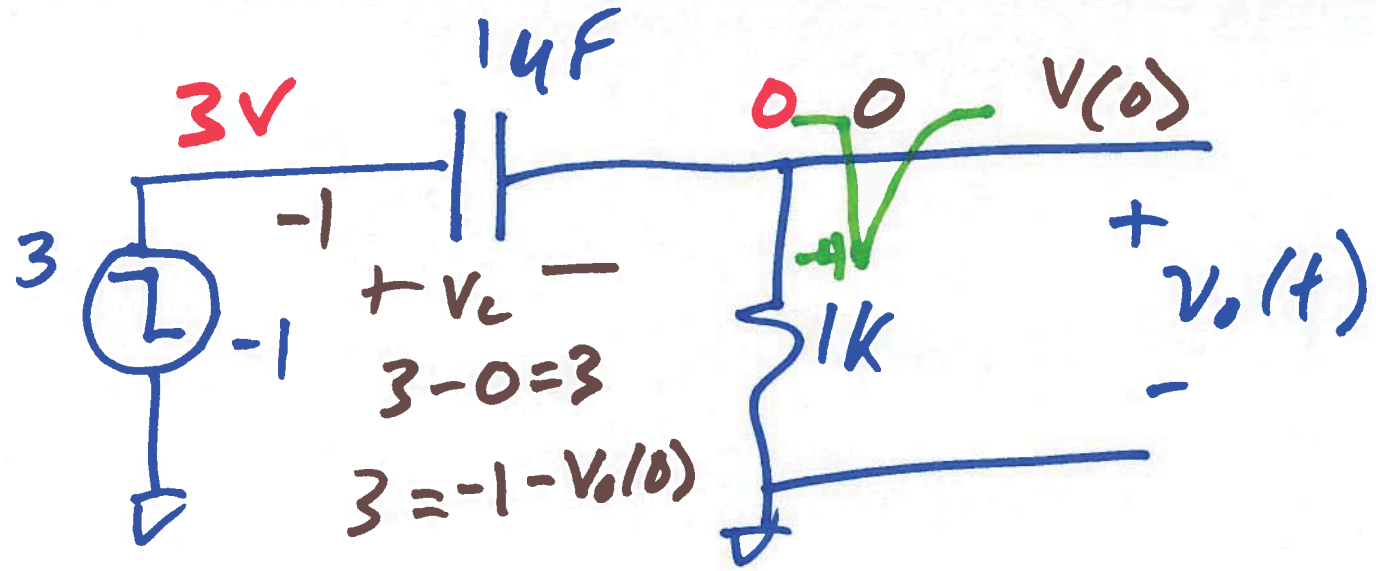


$$-1 - 0 = V_c = -1$$

$$V_c = -1 = 3 - V_0(0) \rightarrow V_0(0) = 4V$$

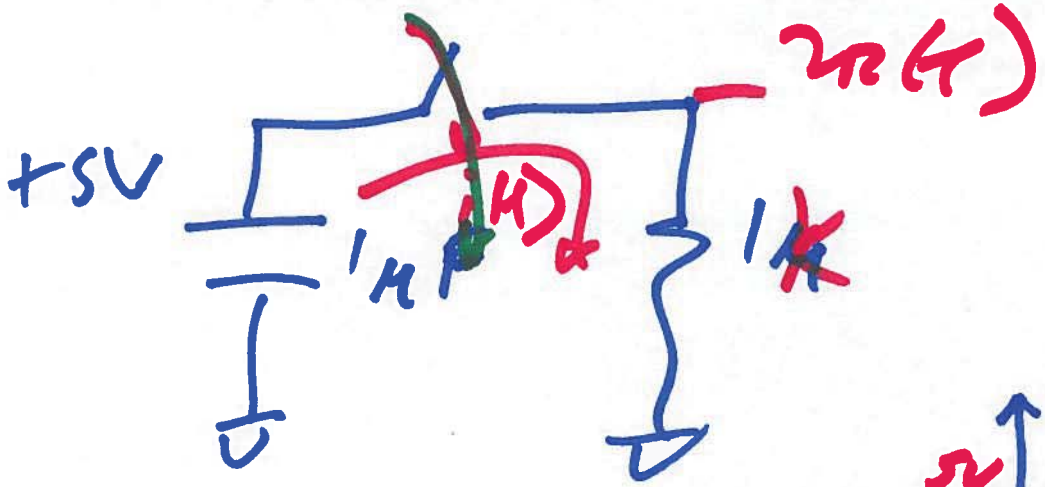
$$v_0(t) = v_f + (v_i - v_f)e^{-t/RC}$$

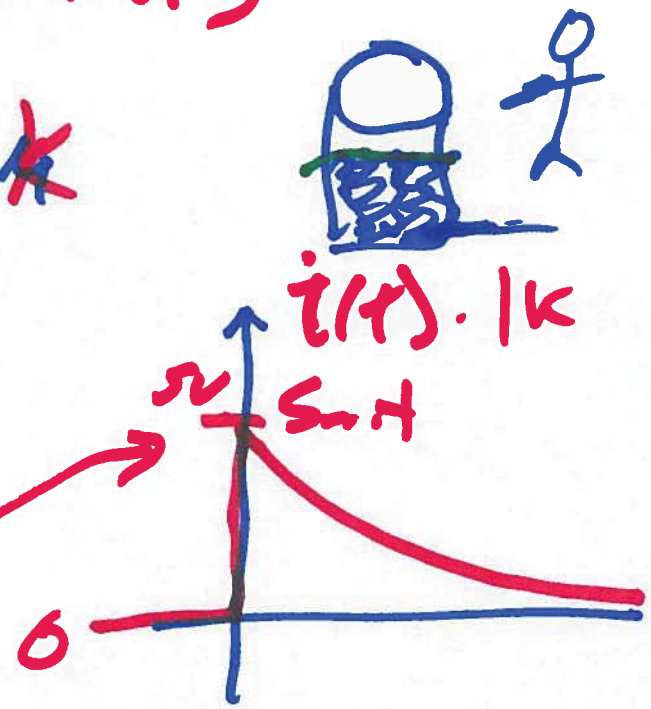
$$= 0 + (4 - 0)e^{-t/RC} = 4e^{-t/RC}$$



$V_o(0) = -4V$

$V_i = -4, \quad V_f = 0$





$v_i = 5V$

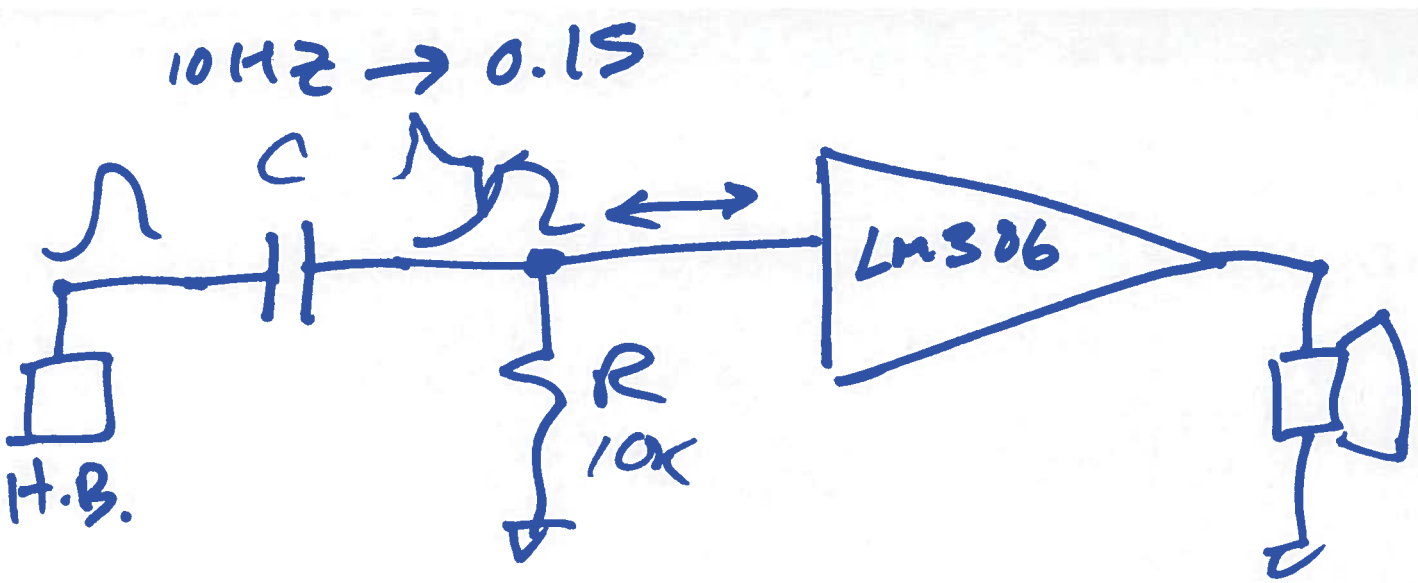
$v_f = 0$

$$v_R(t) = 5e^{-t/RC} = 0 + (5-0)e^{-t/RC}$$

$$i(t) = \frac{v_R(t)}{1k} = 5mA\,e^{-t/RC} \qquad t > 0$$

switch closed

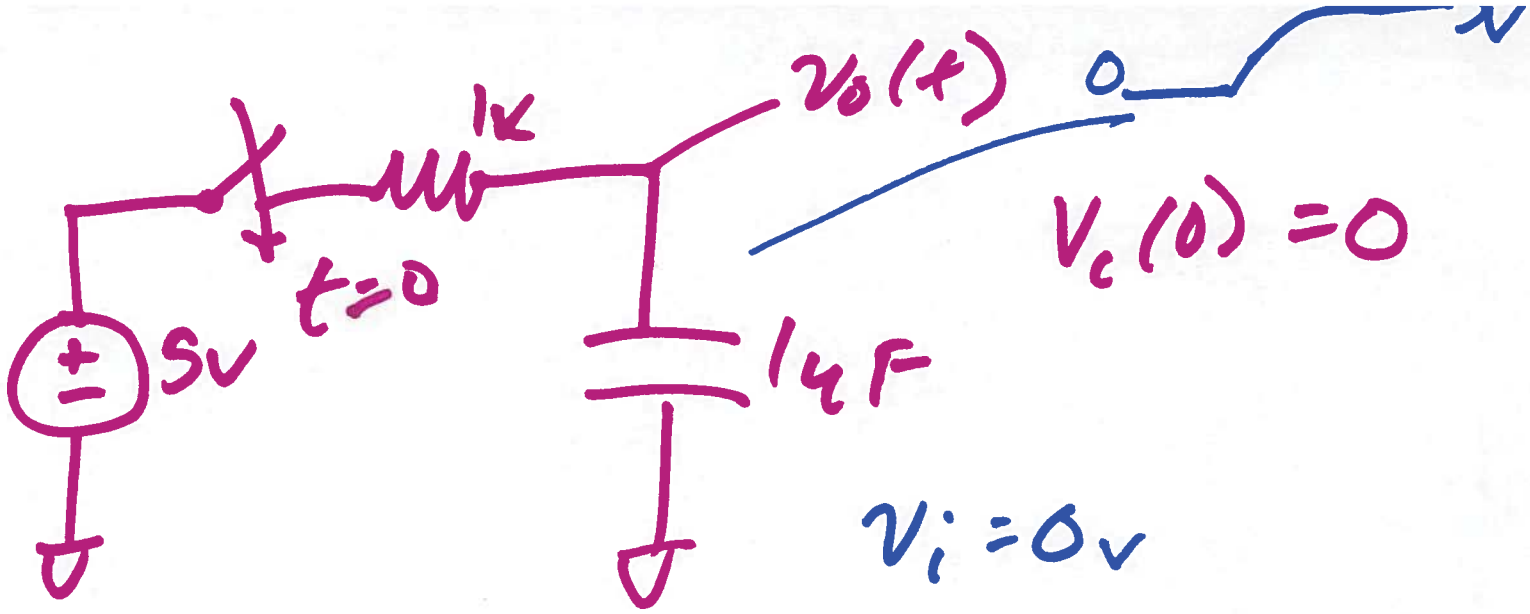
$$v_R(t) = v_f + (v_i - v_f)e^{-t/RC}$$



100 Hz – 1KHz

$\tau \gg 0.1\,s$

$$f = \frac{1}{T} = 10 = \frac{1}{0.1}$$



$v_i = 0V$

$v_f = 5V$

$$v_o(t) = 5 + (0-5)e^{-t/RC}$$

$$= 5(1 - e^{-t/RC})$$