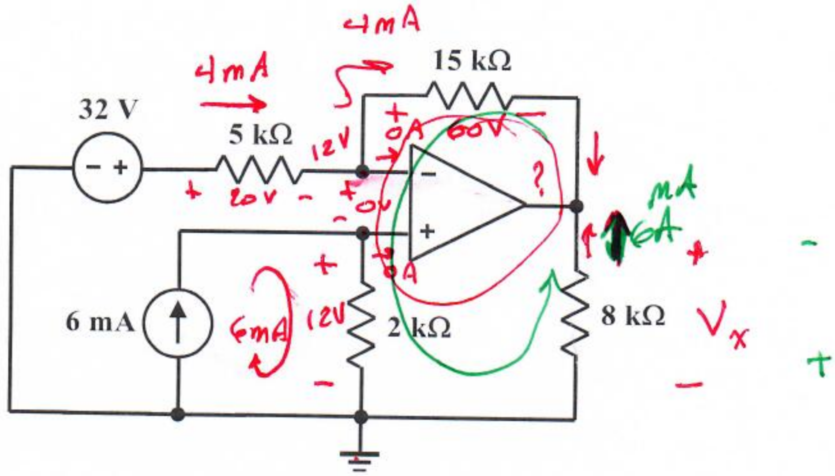
EE/EET 2240

Homework Problem #036



The OpAmp is ideal. Determine the amount of power absorbed by the 8 kΩ resistor.

$-60V + 0V + 12V = V_x$

$V_x = -48 V$

$(6mA)(48V) = 288 mW$

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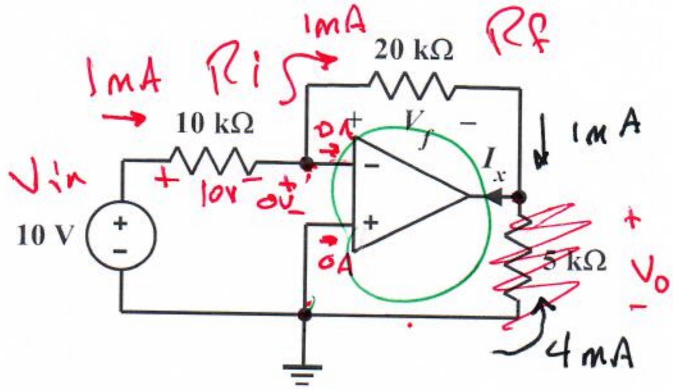
Homework Problem #035



$V_o = -\frac{R_f}{R_i} V_{in}$

gain

The OpAmp is ideal. Determine:

(a) The value of V_f.

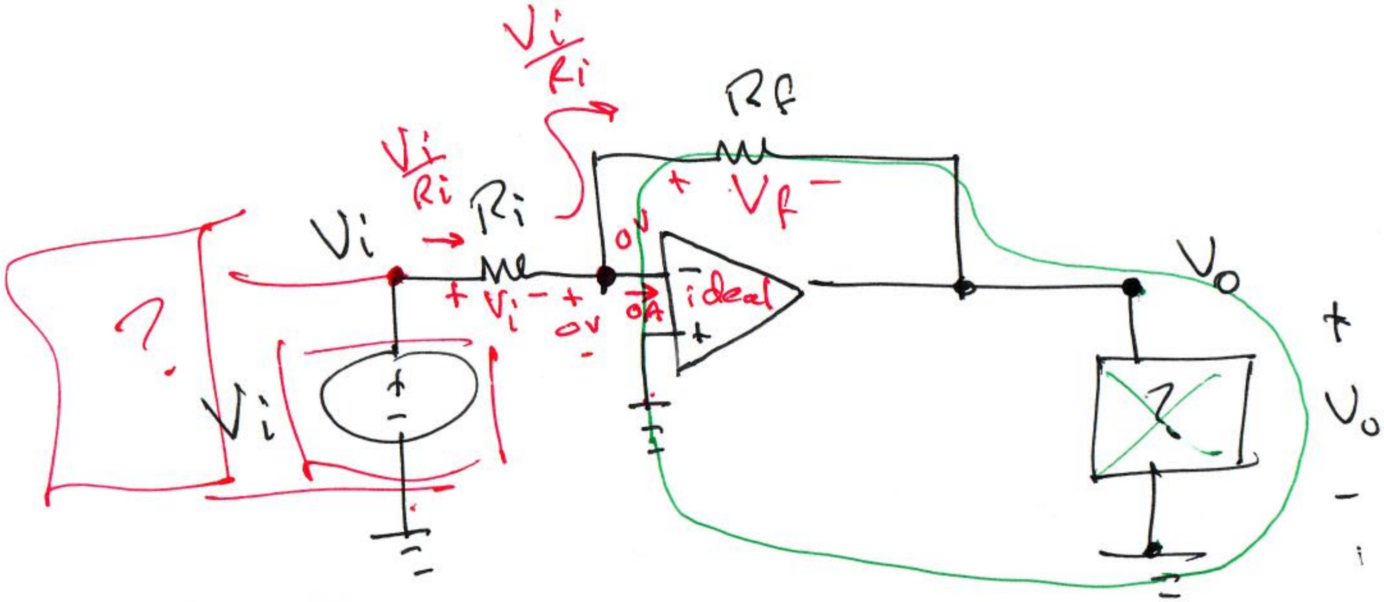
$V_f = -V_o$

$-0 + V_f + V_o = 0 \Rightarrow V_f = -V_o$

$V_f = \underline{20\text{V}}$

(b) The value of I_x.

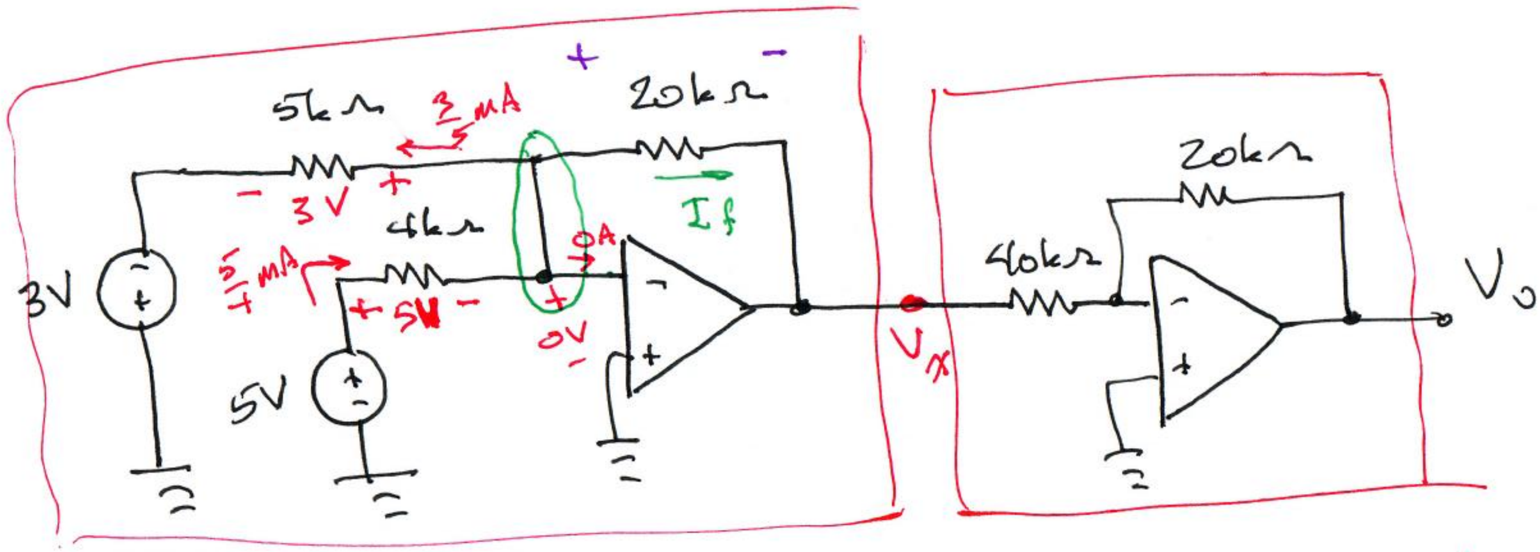
$I_x = 4\text{mA} + 1\text{mA} = 5\text{mA}$



$$V_f = \frac{R_f V_i}{R_i} = \frac{R_f}{R_i} V_i$$

$$-V_o - V_f + 0 = 0$$

$$V_o = -V_f$$



$1.25\,mA - 0.6\,mA = I_f$

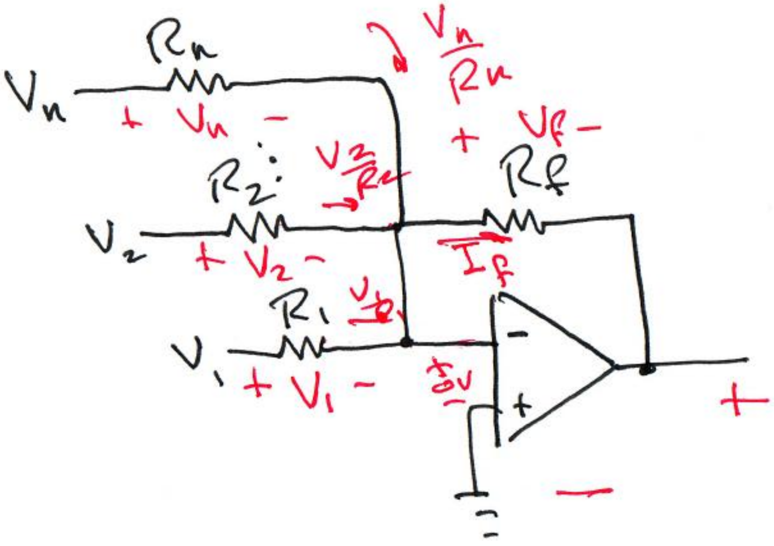
$I_f = \frac{13}{20}\,mA = 0.65\,mA$

$V_x = -13\ V$

$V_o = -\frac{20k\Omega}{40k\Omega} \cdot V_x$

$= -\frac{1}{2} V_x$

$V_o = -\frac{1}{2}(-13) = 6.5V$



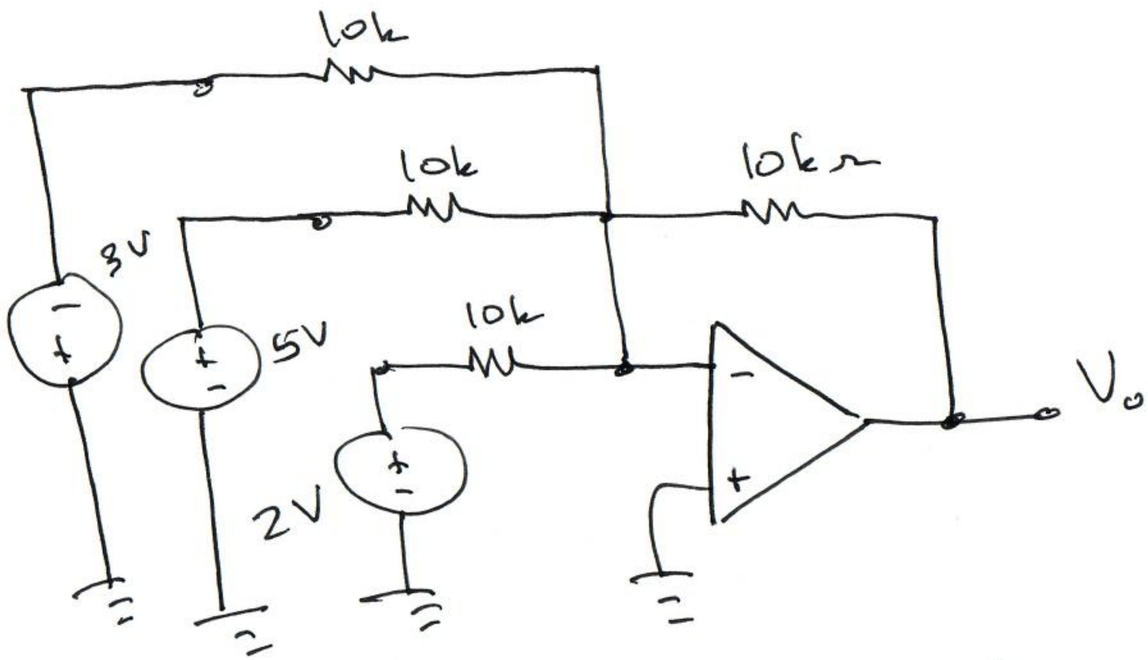
$$V_o = -\frac{R_f}{R_1} V_1 - \frac{R_f}{R_2} V_2 - \cdots - \frac{R_f}{R_n} V_n$$

$$I_f = \frac{V_1}{R_1} + \frac{V_2}{R_2} + \cdots + \frac{V_n}{R_n}$$

$$V_f = R_f I_f = \frac{R_f}{R_1} V_1 + \frac{R_f}{R_2} V_2 + \cdots + \frac{R_f}{R_n} V_n$$

$$V_o = -V_f = -\frac{R_f}{R_1} V_1 - \frac{R_f}{R_2} V_2 + \cdots - \frac{R_f}{R_n} V_n$$

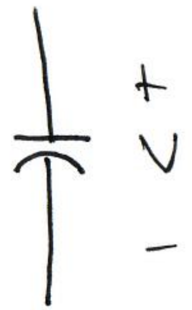
Summing Amplifier

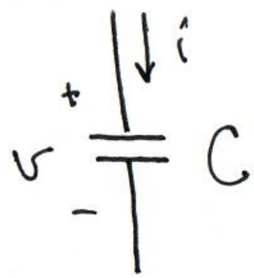


$$V_o = -1(2) - 1(5) - 1(-3)$$

$$= -4\ V$$

Capacitor (Condensers)





farad, F

If defined to satisfy the PSC, then

$$i = C\frac{dv}{dt}$$

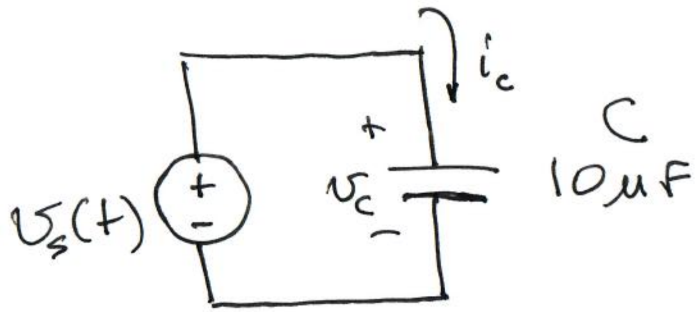
or

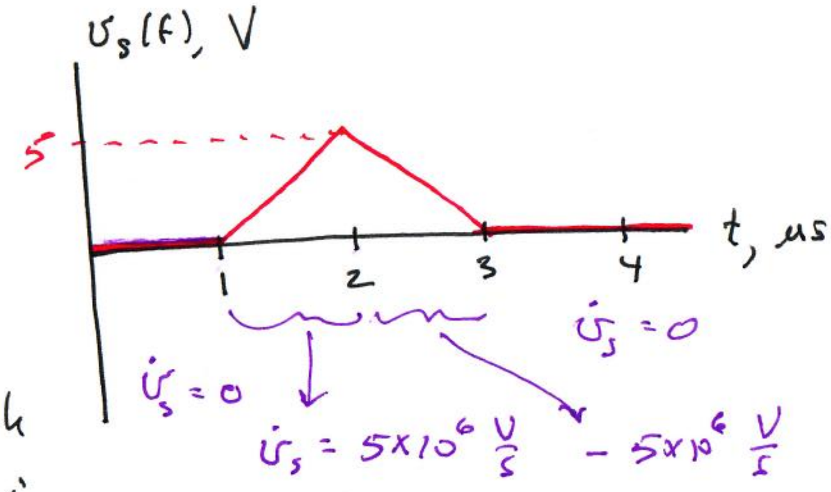
$$v(t) = \frac{1}{C}\int_{-\infty}^{t} i\,d\tau$$

$$= \frac{1}{C}\int_{-\infty}^{0} i\,d\tau + \frac{1}{C}\int_{0}^{t} i\,d\tau$$

$$= v(0) + \frac{1}{C}\int_{0}^{t} i\,d\tau$$

initial voltage





Determine and sketch the capacitor current, i_c.

$$i_c = C\dot{v}_c = C\dot{v}_s = (10\times10^{-6})\,\dot{v}_s$$