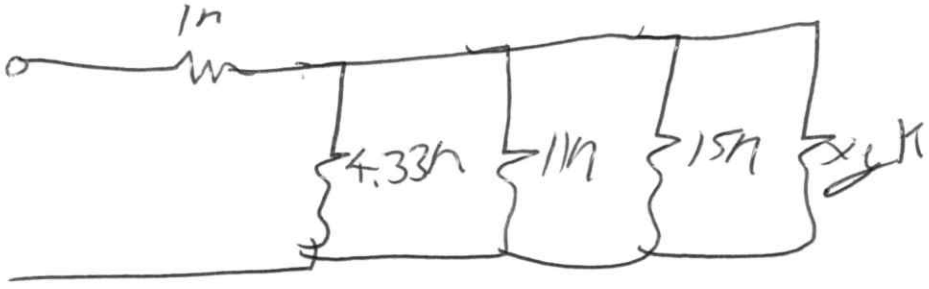
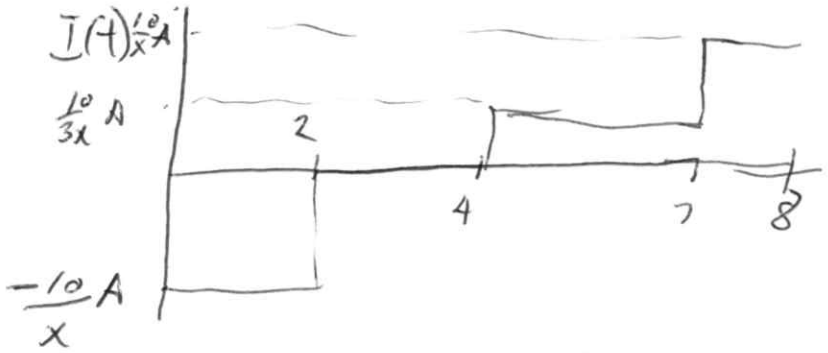
①



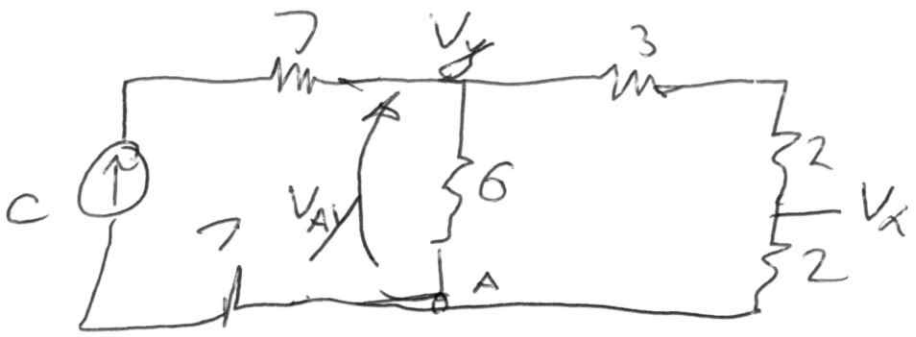
$$R_{eq} = 1\Omega + \left(\frac{1}{2.57\Omega} + \frac{1}{xy\Omega}\right)^{-1}$$

(2)



$$\text{Charge} = \left(\frac{10}{3x}\right)(3) + \left(\frac{10}{x}\right)(1) = \frac{20}{x}\ C$$

3

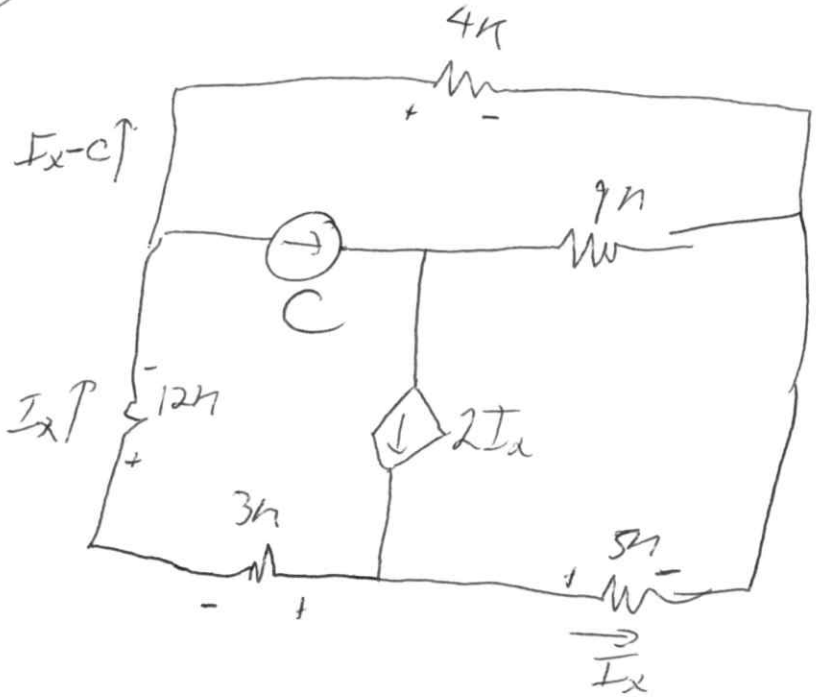


$V_A = C(7 \| 6) = 3.23C$

$V_{xy} = V_A\left(\frac{5}{7}\right) = \left(\frac{5}{7}\right)(3.23)C$

$= 2.3C$

4



Going around outside of circuit

~~3Ω~~ $-3I_x - 12I_x - 4(I_x - C) + 5I_x = 0$

$-10I_x - 4I_x + 4C = 0$

$4C = 14I_x$

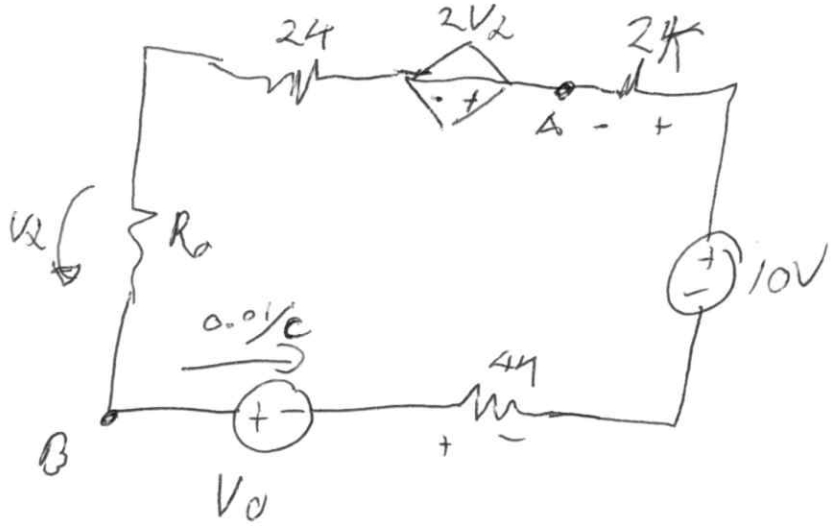
$I_x = \frac{4}{14} C$

$V_x = \left(\frac{4}{14} C - C\right) 4\Omega$

$= -2.86C$

(5) ~~$\frac{100mW}{10V} = 10mA$~~

$$I = \frac{0.1}{10C} = \frac{0.01}{C}$$

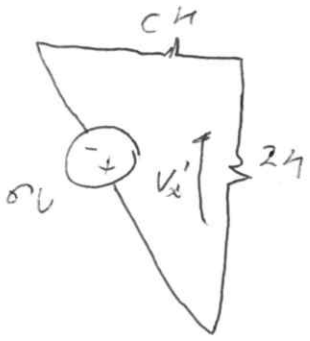


$$V_{BA} = -10 + V_0 + 6\Omega\left(\frac{0.01}{C}\right)$$

$$= -10 + 10C + \frac{60}{C}$$

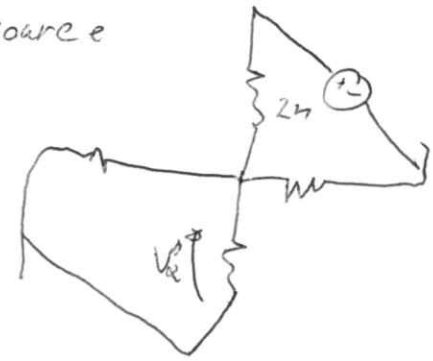
(6) Sup

6V source:



$$V_x' = -6V\left(\frac{2}{2+C}\right)$$

4V source

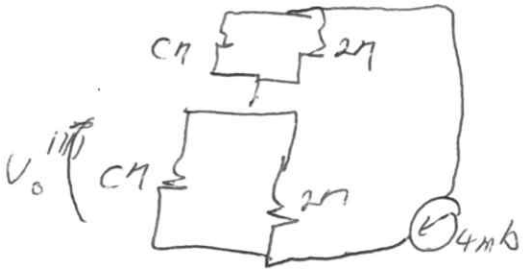


$V_x'' = 0$ (no loop)

6mA source

$$V_x''' = (6mA)\left(\frac{1}{C\Omega} + \frac{1}{2\Omega}\right)^{-1}$$
$$= 6\left(\frac{1}{C} + \frac{1}{2}\right)^{-1}$$

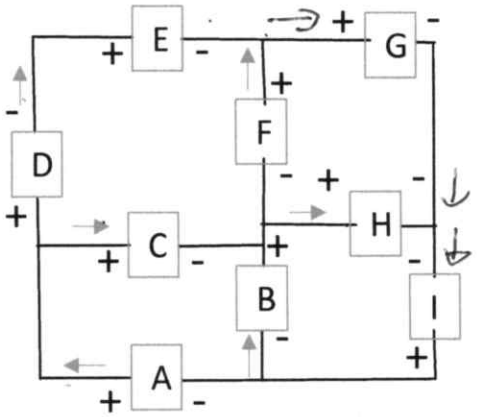
4mA source:



$$V_x'''' = -4\left(\frac{1}{C} + \frac{1}{2}\right)^{-1}$$

$$V_x = -6\left(\frac{2}{2+C}\right) + 2\left(\frac{1}{C} + \frac{1}{2}\right)^{-1}$$

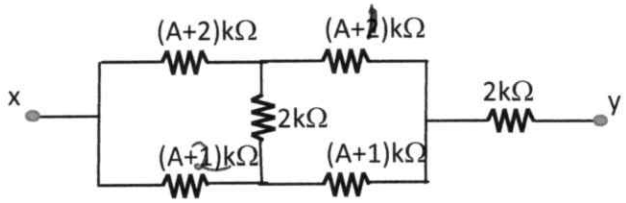
7) In the following circuit some measured voltages and currents are labeled. Which elements in the circuit CANNOT be resistors?



supplying Power:

A, B, F, I

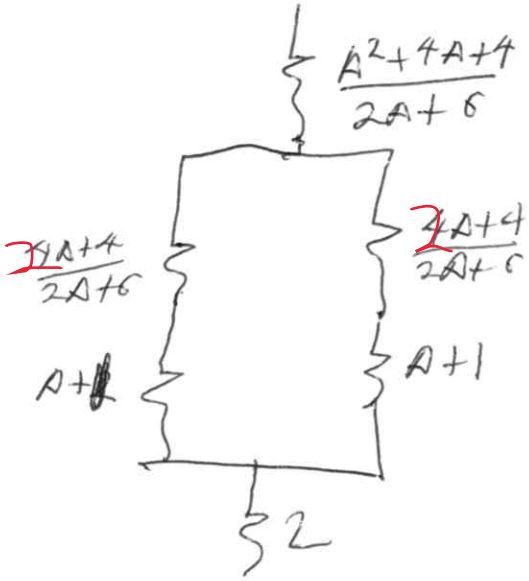
8) For the following circuit find the resistance between point x and y, note that A is the last digit of your student number.



$$R_a = \frac{(A+2)(A+2)}{A+2+A+2+2} = \frac{A^2+4A+4}{2A+6}$$

$$R_b = \frac{(A+2)(2)}{2A+6} = \frac{2A+4}{2A+6}$$

$$R_c = \frac{2A+4}{2A+6}$$



$$R_{eq} = \frac{A^2+4A+4}{2A+6} + \frac{1}{2}\left(\frac{2A+4}{2A+6} + A+1\right) + 2$$