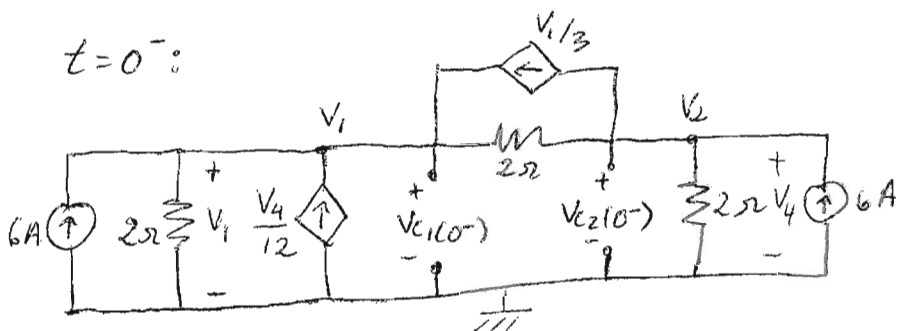


$t=0^-$:



MÉTODO DE VOLTAJES DE NODOS:

$$\left(\frac{1}{2} + \frac{1}{2}\right)V_1 - \frac{1}{2}V_2 = 6 + \frac{V_4}{12} + \frac{V_1}{3} \Rightarrow \frac{2}{3}V_1 - \frac{7}{12}V_2 = 6 \quad (1)$$

$$-\frac{1}{2}V_1 + \left(\frac{1}{2} + \frac{1}{2}\right)V_2 = 6 - \frac{V_1}{3} \Rightarrow -\frac{1}{6}V_1 + V_2 = 6 \quad (2)$$

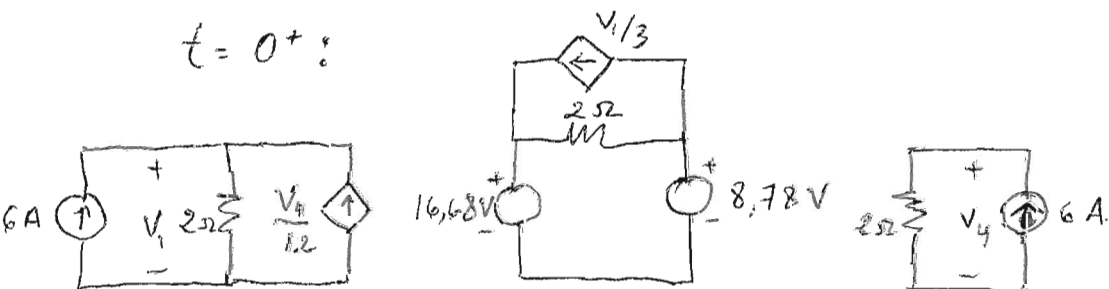
$$\frac{1}{3} - \frac{1}{2} = \frac{2}{6} - \frac{3}{6}$$

$$V_1 = 16,68 \text{ V}$$

$$V_2 = 8,78 \text{ V}$$

$$V_{C1}(0^-) = 16,68 \text{ V} \quad V_{C2}(0^-) = 8,78 \text{ V}$$

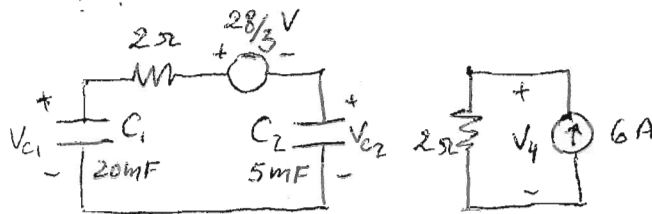
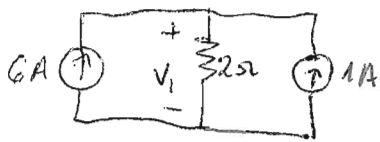
$t=0^+$:



$$V_{C1}(0^+) = V_{C1}(0^-) = 16,68 \text{ V}$$

$$V_{C2}(0^+) = V_{C2}(0^-) = 8,78 \text{ V}$$

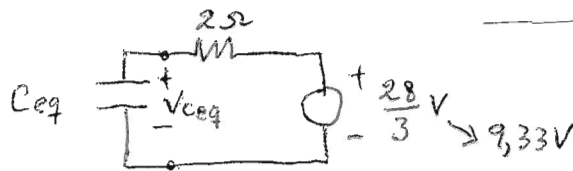
$t > 0$:



$V_4 = 12V$
 $V_1 = 14V$

Equivalente de Thevenin:

$$C_{eq} = \frac{20m \cdot 5m}{25m} = 4mF$$



$$V_{ceq}(t) = V_{ceq}(\infty) + (V_{ceq}(0+) - V_{ceq}(\infty)) e^{-\frac{t}{R_{TH} C_{eq}}}$$

$\tau = R_{TH} \cdot C_{eq} = 2 \cdot 4m = 8ms$
 $t_s = 5\tau = 40ms$

$$V_T(t) = 9,33 + (7,9 - 9,33) e^{-\frac{t}{8m}} V$$

$$V_T(t) = 9,33 - 1,43 e^{-\frac{t}{8m}} V$$

DIVISOR DE TENSION EN CAPACITORES:

$$V_1': V_{C1}(t) = V_{C1}(0+) + (V_T(t) - V_T(0+)) \frac{C_2}{C_1 + C_2}$$

$$V_{C1}(t) = 16,68 + (9,33 - 1,43 e^{-\frac{t}{8m}} - 7,9) \frac{5m}{25m}$$

$$V_{C1}(t) = 16,96 - 0,28 e^{-\frac{t}{8m}} V$$

$$V_2': -V_{C2}(t) \Rightarrow V_2'(t) = V_2'(0+) + (V_T(t) - V_T(0+)) \frac{C_1}{C_1 + C_2}$$

$$V_2'(t) = -8,78 + (9,33 - 1,43 e^{-\frac{t}{8m}} - 7,9) \frac{20m}{25m}$$

$$V_2'(t) = -7,63 - 1,14 e^{-\frac{t}{8m}}$$

$$V_{C2}(t) = 7,63 + 1,14 e^{-\frac{t}{8m}}$$

$$V_{ceq}(0+) = V_{C1}(0+) - V_{C2}(0+)$$

$$V_{ceq}(0+) = 16,68 - 8,78$$

$$V_{ceq}(0+) = 7,9 V$$

$$V_{ceq} \begin{cases} + \frac{1}{-} & + V_{C1} \\ + \frac{1}{-} & - V_{C2} \end{cases}$$

$$V_{ceq} = V_1' + V_2' = V_{C1} - V_{C2}$$

%Código en Matlab para graficar

```
t=0:0.001:0.1;%segundos
vc1=16.96-0.28*exp(-t/(8e-3));
vc2=7.63+1.14*exp(-t/(8e-3));
tms=t*1000;
figure
subplot(211)
plot(tms,vc1,'b')
title('Vc1')
xlabel('ms');ylabel('V')
subplot(212)
plot(tms,vc2,'r')
title('Vc2')
xlabel('ms');ylabel('V')
```

