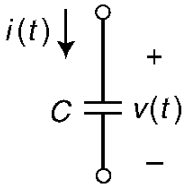
Element Equations

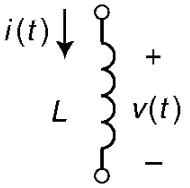
Capacitor:



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

$$i(t) = C\frac{dv(t)}{dt}$$

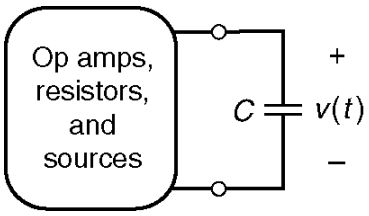
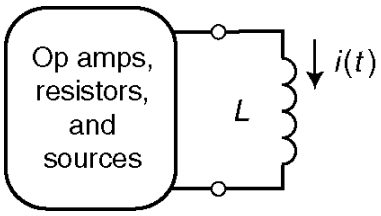
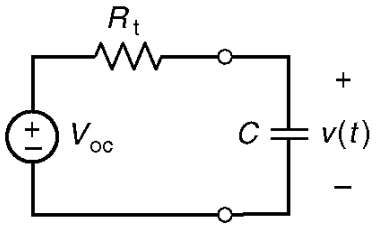
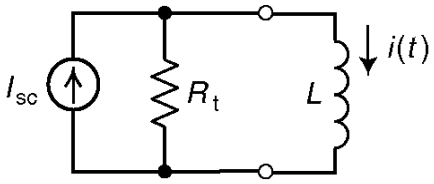
Inductor:



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

$$v(t) = L\frac{di(t)}{dt}$$

First-Order Circuits

FIRST-ORDER CIRCUIT CONTAINING A CAPACITOR	FIRST-ORDER CIRCUIT CONTAINING AN INDUCTOR
	
Replace the circuit consisting of op amps, resistors, and sources by its Thévenin equivalent circuit:	Replace the circuit consisting of op amps, resistors, and sources by its Norton equivalent circuit:
	
The capacitor voltage is: $$v(t) = V_{oc} + \left(v(0) - V_{oc}\right)e^{-\frac{t}{\tau}}$$ where the time constant, τ, is $$\tau = R_t C$$ and the initial condition, $v(0)$, is the capacitor voltage at time $t = 0$.	The inductor current is $$i(t) = I_{sc} + \left(i(0) - I_{sc}\right)e^{-\frac{t}{\tau}}$$ where the time constant, τ, is $$\tau = \frac{L}{R_t}$$ and the initial condition, $i(0)$, is the inductor current at time $t = 0$.