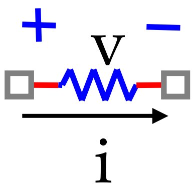
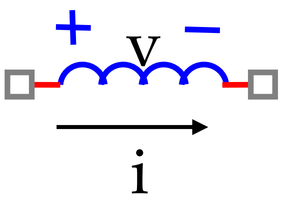
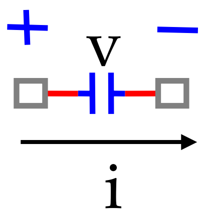
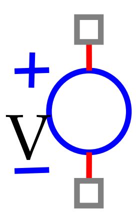
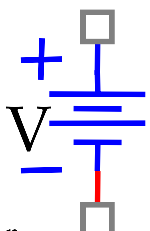
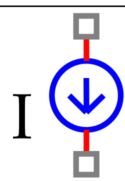
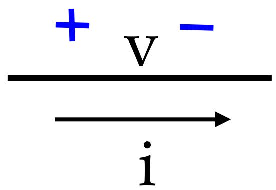
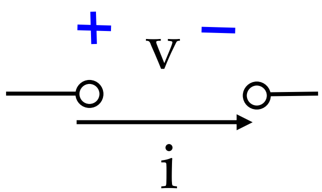
Electrical Elements

Element	Symbol	Element law	Energy storage	State	Init condit, replace w/	Steady-state, replace w/
R (resistor)		$v = iR$	None; dissipation: $P = vi$ $= i^2R = V^2/R$	None	Same	Same
L (inductor)		$v = L\ di/dt$ $di/dt = v/L$	$E = ½L\ i^2$ (no dissipation)	i	Current source (because current can't change inst.) (or open if zero)	Short (with derivative = 0, $v = 0$ => short)
C (capacitor)		$i = C\ dv/dt$ $dv/dt = i/C$	$E = ½C\ v^2$ (no dissipation)	v	Voltage source (because voltage can't change inst.) (or short if zero)	Open (with derivative = 0, $i = 0$ => open)
V (voltage source)	 or 	$v = V$ (const) i = anything	Energy source	None (can be an input)	Same	Same
I (current source)		$i = I$ (const) v = anything	Energy source	None (can be an input)	Same	Same

Element	Symbol	Element law	Energy storage	State	Init condit, replace w/	Steady-state, replace w/
Short (wire) Special case of voltage source with $V = 0$		$v = 0$ i = anything	No dissipation or storage.	None	Same	Same
Open (no connection) Special case of current source with $I = 0$		$i = 0$ v = anything	No dissipation or storage.	None	Same	Same

Note: when replacing elements with sources for initial conditions, use a source value equal to the known state value (equal at $t = 0+$ and $t = 0-$.