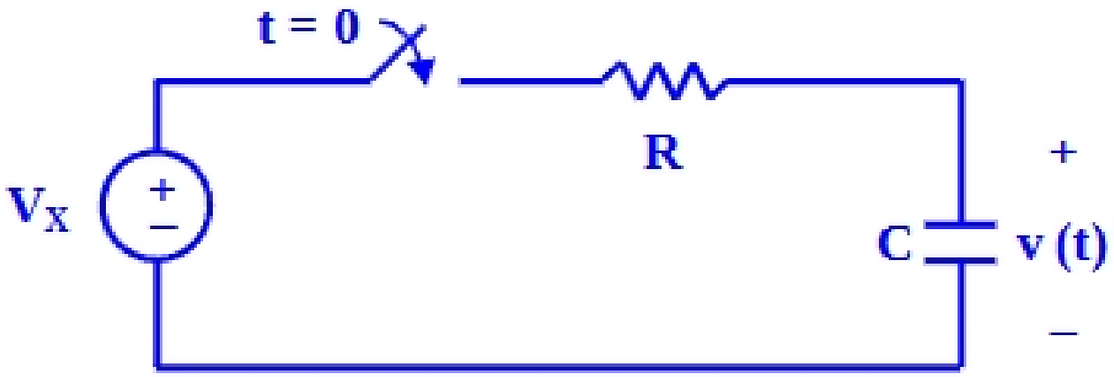
Reading Assignment: Chapter 7 in Electric Circuits, 9th Ed. by Nilsson

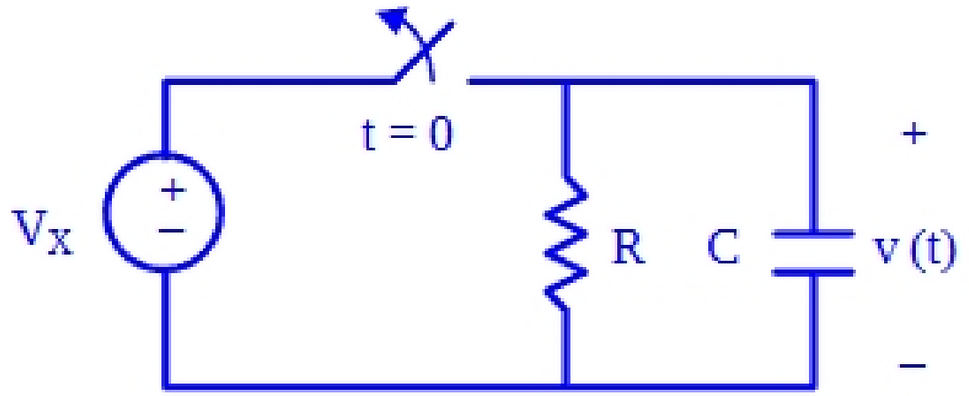
Example: Capacitor charging circuit.

Find v(t) for $t \geq 0$.



Example: Capacitor discharging circuit.

Find v(t) for $t \geq 0$.



1st-order Circuits with Dependent Sources

Dependent sources affect the resistance seen by the inductor or capacitor and therefore affect the value of τ for the circuit. Two approaches can be used to find τ:

1) When R_{EQ} seen by an inductor or a capacitor, remove the L or C, kill any independent sources, and place any value independent source at the terminals. Then

$$R_{EQ} = \frac{\text{terminal voltage}}{\text{terminal current}}$$

2) Write a DE for the circuit (any variable) and τ can be easily determined from the DE since it has the form:

$$\frac{dx}{dt} + \frac{1}{\tau}x(t) = f(t)$$

Example: Find v(t) for $t \geq 0$ if $v(0) = 2$ V.

A) Use method 1: Find $\tau = R_{EQ}C$ using $R_{EQ} = \dfrac{\text{terminal voltage}}{\text{terminal current}}$