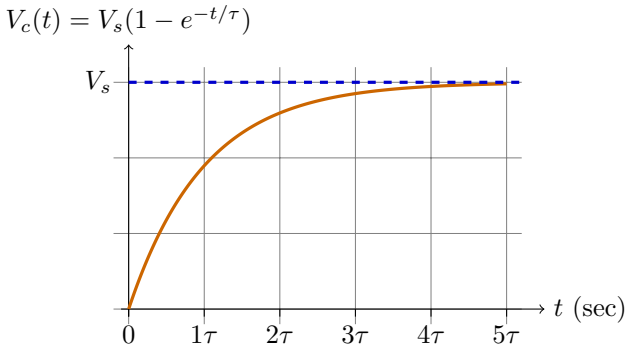
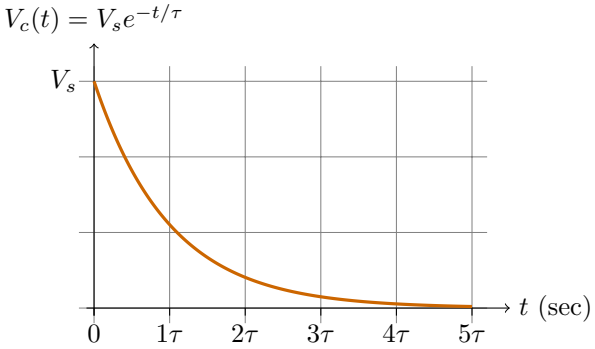
- Capacitance: energy storage components.
- $$C = \frac{Q}{V} \qquad \texttt{Farads (F)}$$
- Symbol

- $$V_c = \frac{1}{C}\int_{-\infty}^{t} I_c dt \tag{1}$$
- $$I_c = C\frac{dV_c(t)}{dt} \tag{2}$$
- Current through a capacitor is zero unless the voltage is changing.
- A useful quantity to use in describing how fast or slow a capacitor charges is $\tau = RC$ (seconds) known as the *time constant*.
- Capacitor charges over time following an exponential curve



- Capacitor discharges over time following an exponential curve



- Time constant may be estimated as

$$\tau \approx \frac{t_{90} - t_{10}}{2.2}$$

where t_{10} is the time to reach 10% of V_s and t_{90} is the time it takes to reach 90% of V_s.

$$V_c(t) = V_s(1 - e^{-t/\tau})$$