Chapter 4

• The material covered in lecture was largely included in the lecture notes for Lecture 10.

• Please read Chapter 4.
First-Order Circuits

- A circuit that contains only (possibly time varying) sources, resistors and an inductor is called an **RL circuit**.
- A circuit that contains only (possibly time varying) sources, resistors and a capacitor is called an **RC circuit**.
- RL and RC circuits are called first-order circuits because their voltages and currents are described by first-order differential equations.
First Order Circuits

KVL around the loop:
\[ v_r(t) + v_c(t) = v_s(t) \]
\[ RC \frac{dv_c(t)}{dt} + v_c(t) = v_s(t) \]

One KCL equation:
\[ \frac{v(t)}{R} + \int_{-\infty}^{t} v(x)dx = i_s(t) \]
\[ \frac{L}{R} \frac{di_L(t)}{dt} + i_L(t) = i_s(t) \]