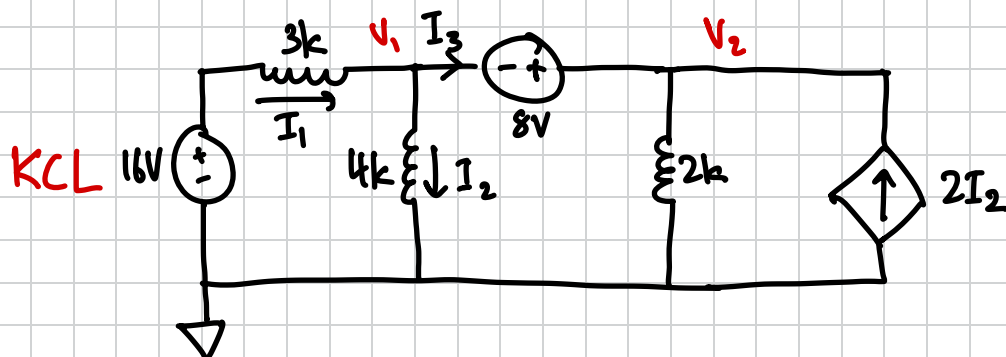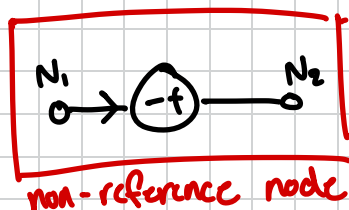# ① Power and Energy in Circuits

$$P = IV$$
$$\Sigma P = 0$$
$$E = Pt$$
$$I = \frac{Q}{t} \quad Q = n \cdot e \quad e = 1.602 \times 10^{-19} C$$

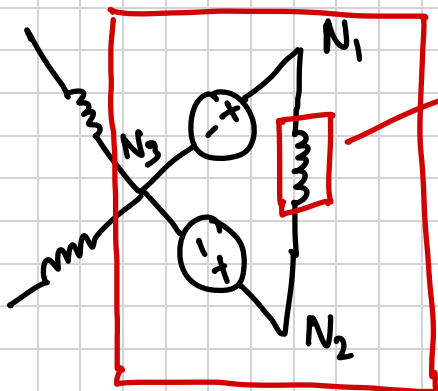# ② Node-Voltage Analysis

KCL, KVL, components laws

☆ Supernode

N_1 → (-+) → N_2

non-reference node

KCL

$$\text{KCL @ } V_1: \quad \frac{16 - V_1}{3k} - \frac{V_1}{4k} - I_3 = 0$$

$$\text{KCL @ } V_2: \quad I_3 + 2I_2 - \frac{V_2}{2k} = 0$$

$$V_2 - V_1 = 8$$

$$\text{KCL for SUPERNODE}(V_1, V_2): \quad \frac{16 - V_1}{3k} + 2I_2 - \frac{V_1}{4k} - \frac{V_2}{2k} = 0$$

IGNORE
- calculate going in & going out.

③ Linearity and Equivalent Circuits

$$y = ax_1 + bx_2$$
$$y(ax_1 + bx_2)$$

} equal ✓