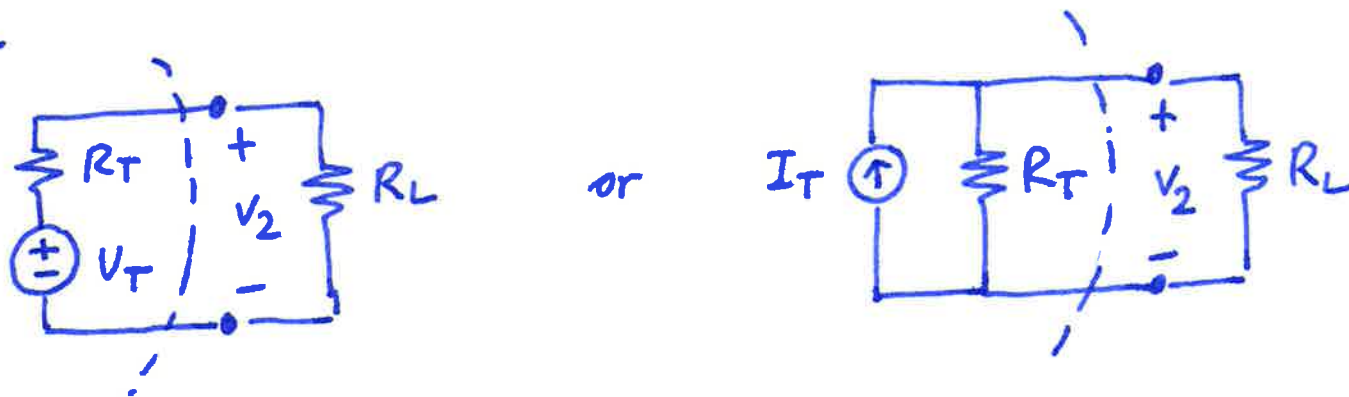
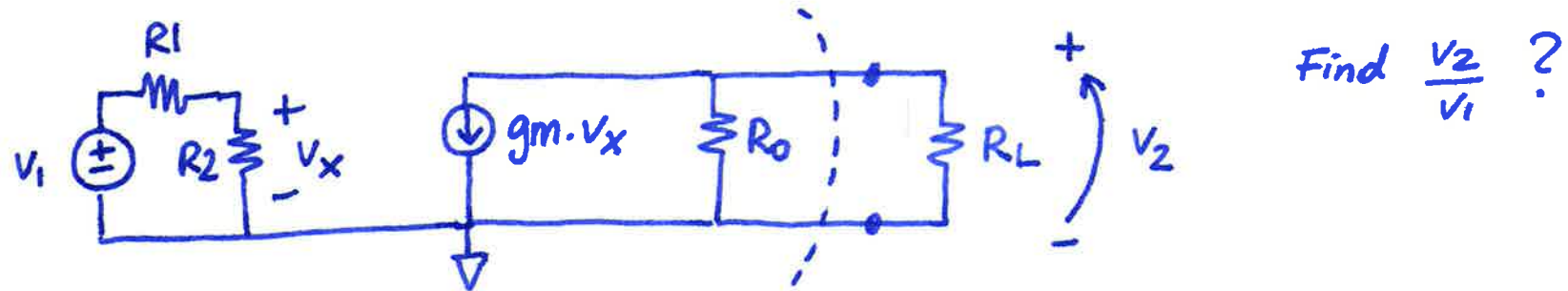
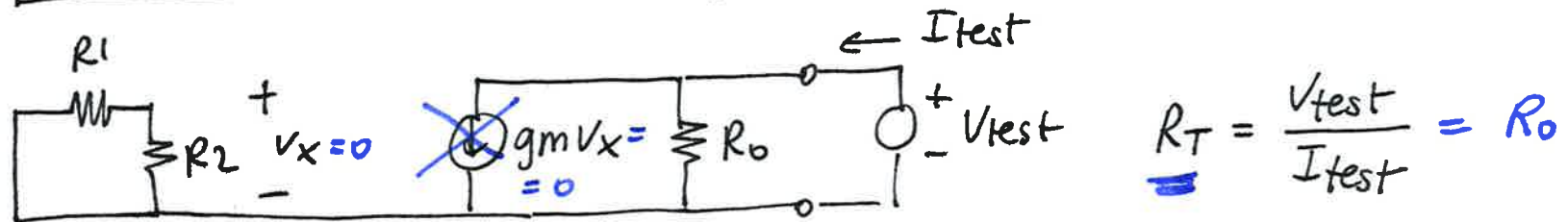
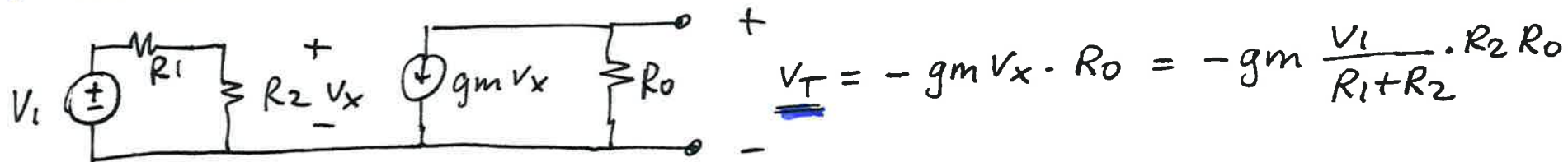


Example #1 (Thevenin/Norton)



• Thevenin

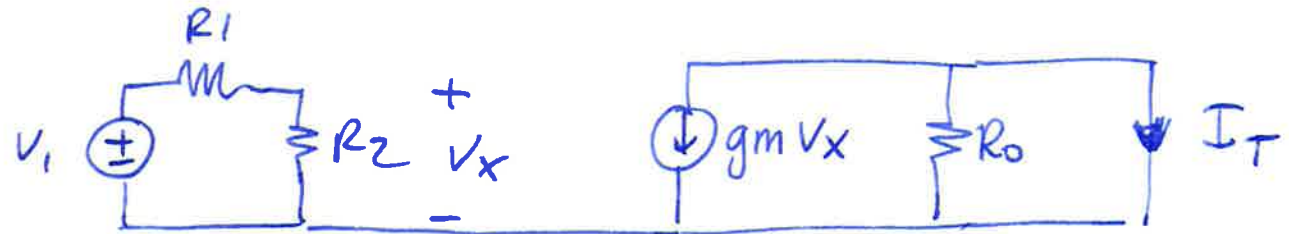


$$V_2 = \frac{V_T}{R_T + R_L} \cdot R_L = -g_m \frac{V_1}{R_1 + R_2} \cdot R_2 \cdot R_o \cdot \frac{R_L}{R_o + R_L}$$

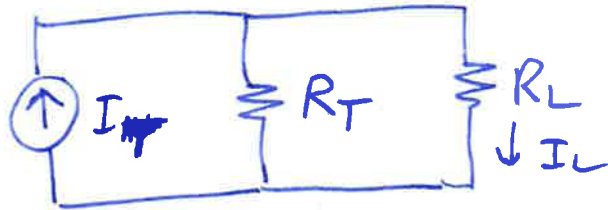
$$\frac{V_2}{V_1} = -g_m \frac{R_2}{R_1 + R_2} \cdot R_o \parallel R_L$$

• NORTON

$I_T = ?$



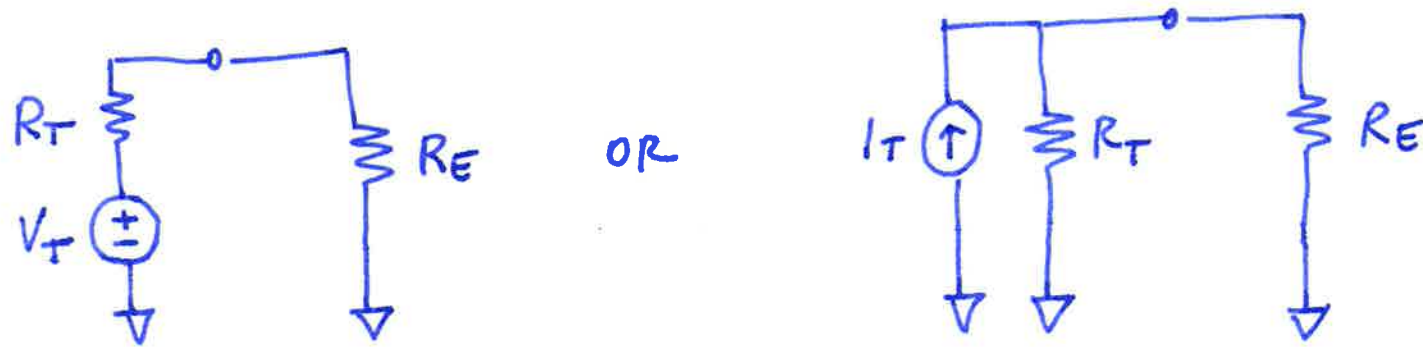
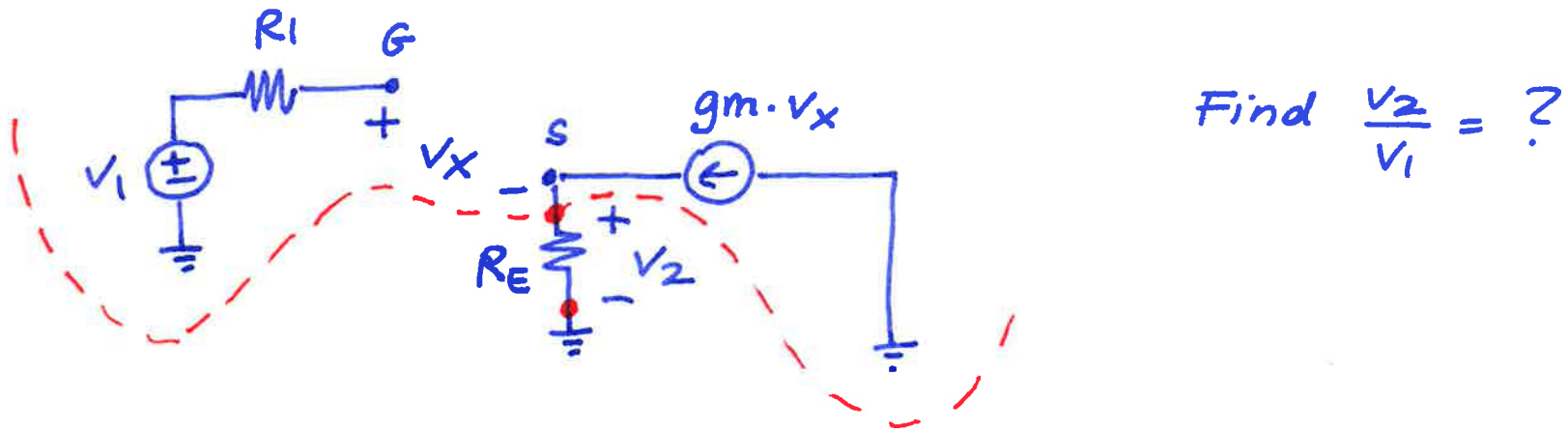
$$I_T = -g_m V_x = -g_m \frac{R_2}{R_1 + R_2} \cdot V_1$$



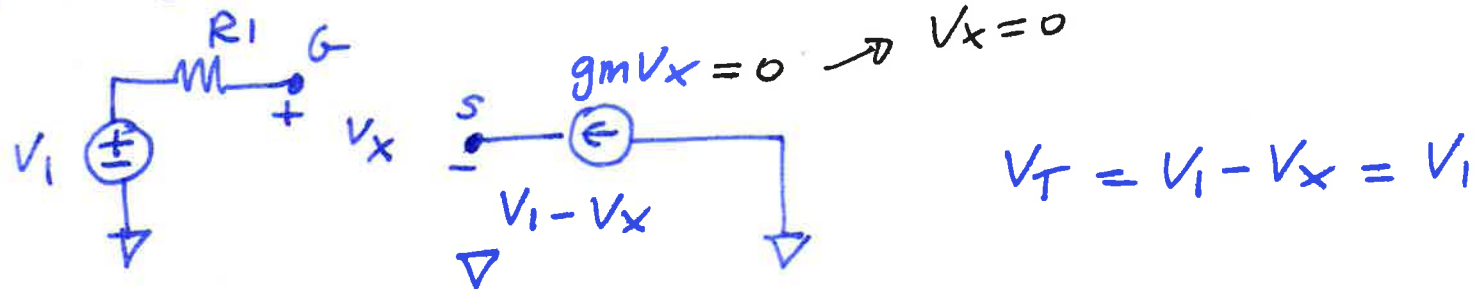
$$V_2 = R_L \cdot I_L = R_L \cdot \frac{I_T}{R_T + R_L} \cdot R_T = I_T \cdot \underbrace{\frac{R_L}{R_o + R_L} \cdot R_o}_{R_o \parallel R_L}$$

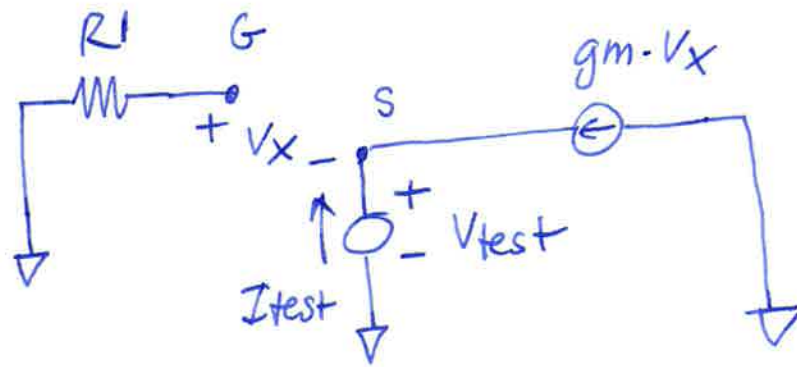
$$\frac{V_2}{V_1} = -g_m \frac{R_2}{R_1 + R_2} \cdot R_o \parallel R_L$$

Example #2 (Thevenin/Norton)



• Thevenin

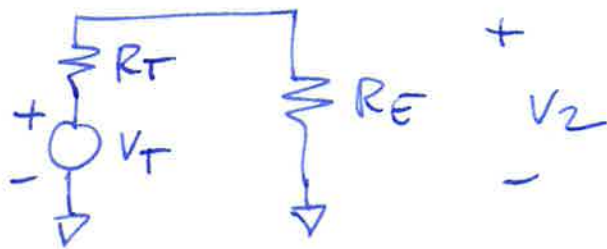




$$V_{test} = -V_X$$

$$I_{test} = -gm \cdot V_X$$

$$R_T = \frac{V_{test}}{I_{test}} = \frac{1}{gm}$$



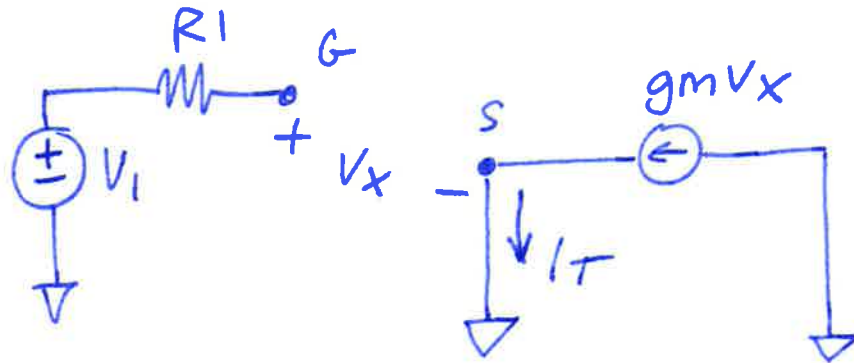
$$V_2 = \frac{R_E}{R_T + R_E} \cdot V_T$$

$$V_2 = \frac{R_E}{\frac{1}{gm} + R_E} \cdot V_1 \quad \rightarrow \quad \frac{V_2}{V_1} = \frac{R_E \cdot gm}{1 + gm R_E} \approx 1$$

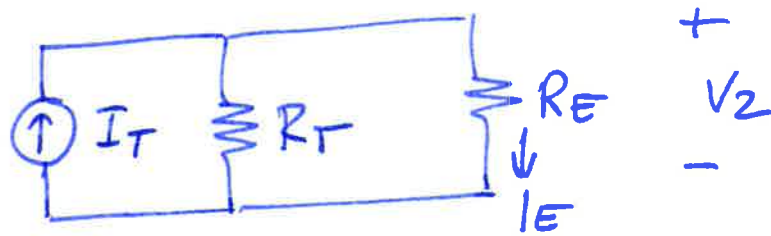
\uparrow
 $gm R_E \gg 1$

VOLTAGE BUFFER

• Norton



$$I_T = gm V_x = gm \cdot V_1$$



$$V_2 = R_E \cdot I_E = R_E \cdot \frac{I_T}{R_T + R_E} \implies$$

$$V_2 = R_E \cdot \frac{1}{gm} \cdot gm \cdot V_1 \cdot \frac{1}{\frac{1}{gm} + R_E}$$

$$\frac{V_2}{V_1} = \frac{R_E}{\frac{1}{gm} + R_E} = \frac{gm R_E}{1 + gm R_E}$$