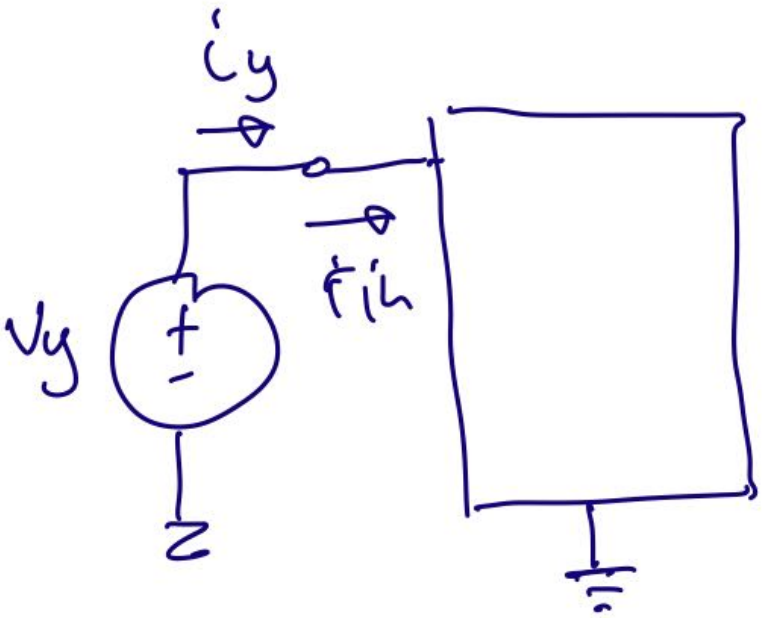
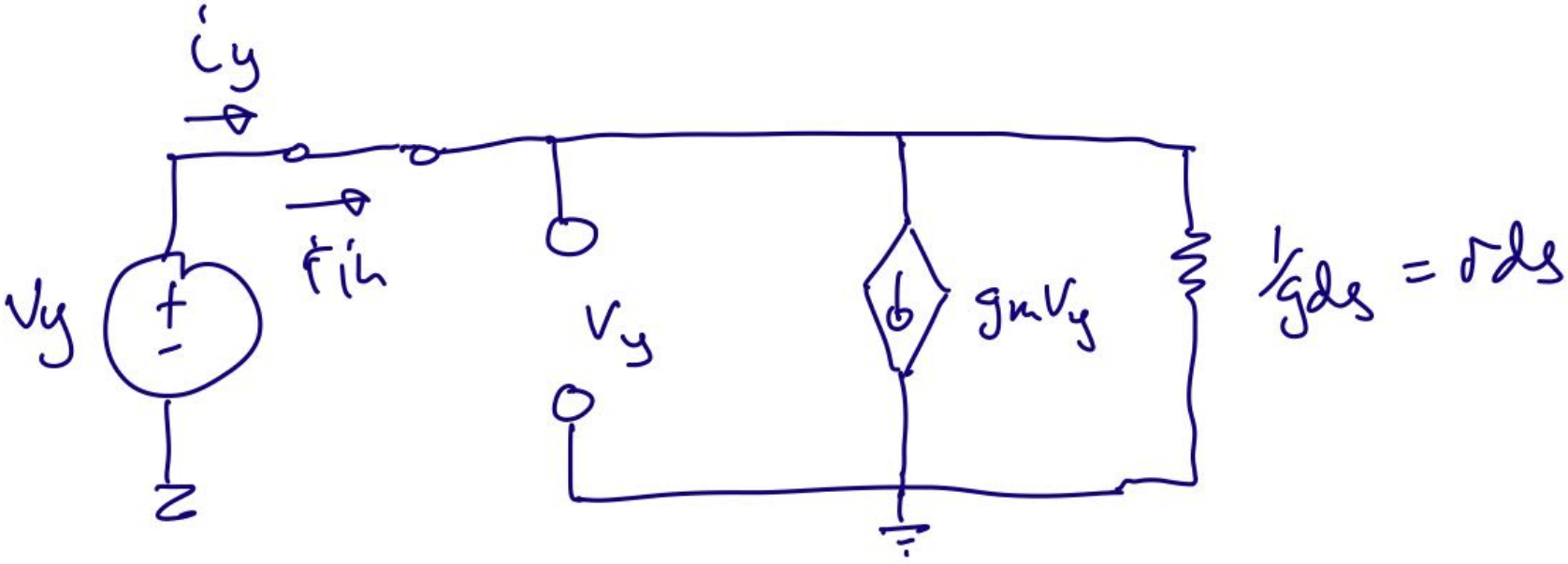


$$i_y = \frac{v_y}{r_{in}}$$



$$i_y = g_{ds} v_y + g_m v_y$$

$$r_{in} = \frac{v_y}{i_y} = \frac{1}{g_m + g_{ds}} \qquad g_m \gg g_{ds} \quad r_{in} \sim \frac{1}{g_m}$$