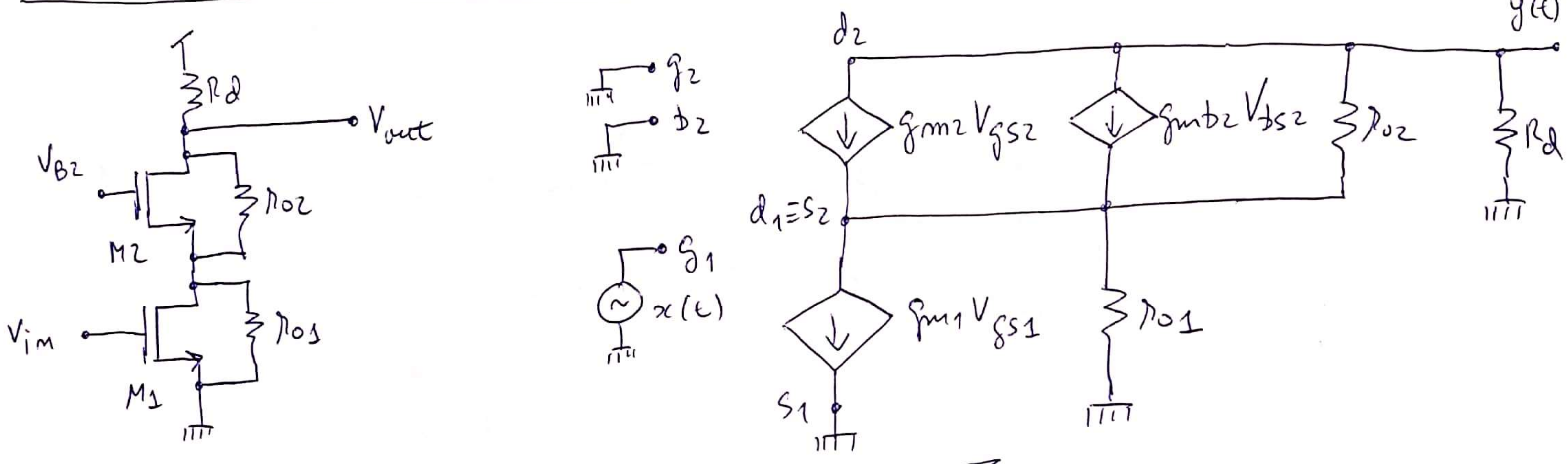
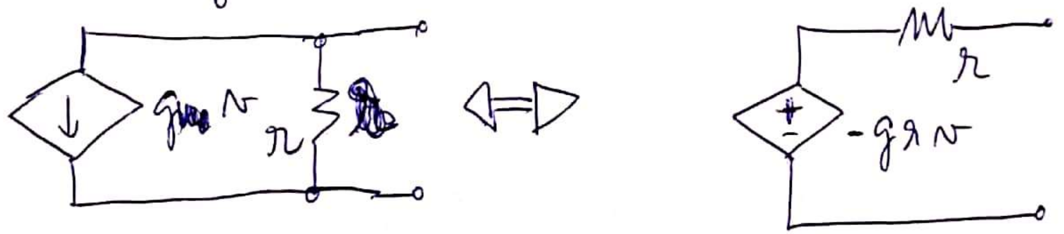
GANHO EXACTO DO CASC AMPL ($\lambda \neq 0$)



~~NESTE CASO $y(t) \neq -g_{m1} V_{gs1}$ $(\neq -g_{m1} x(t))$~~

MAS



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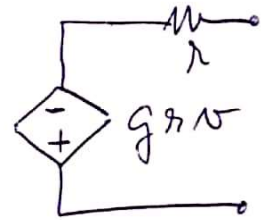
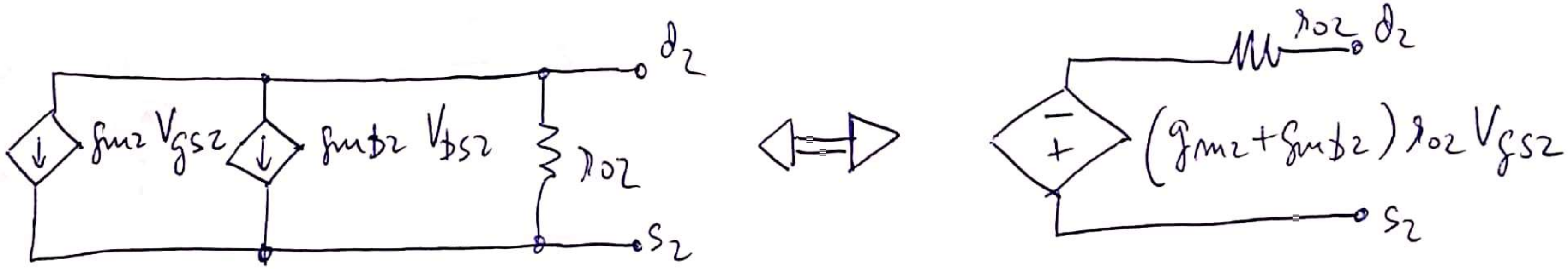
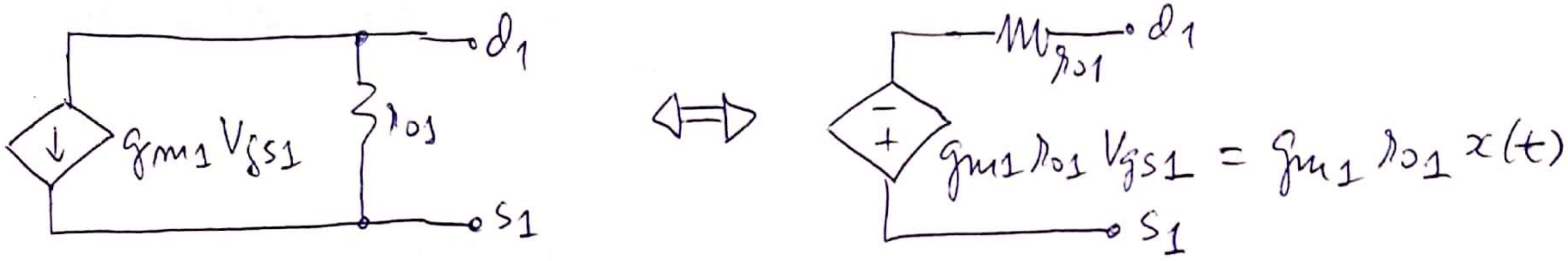
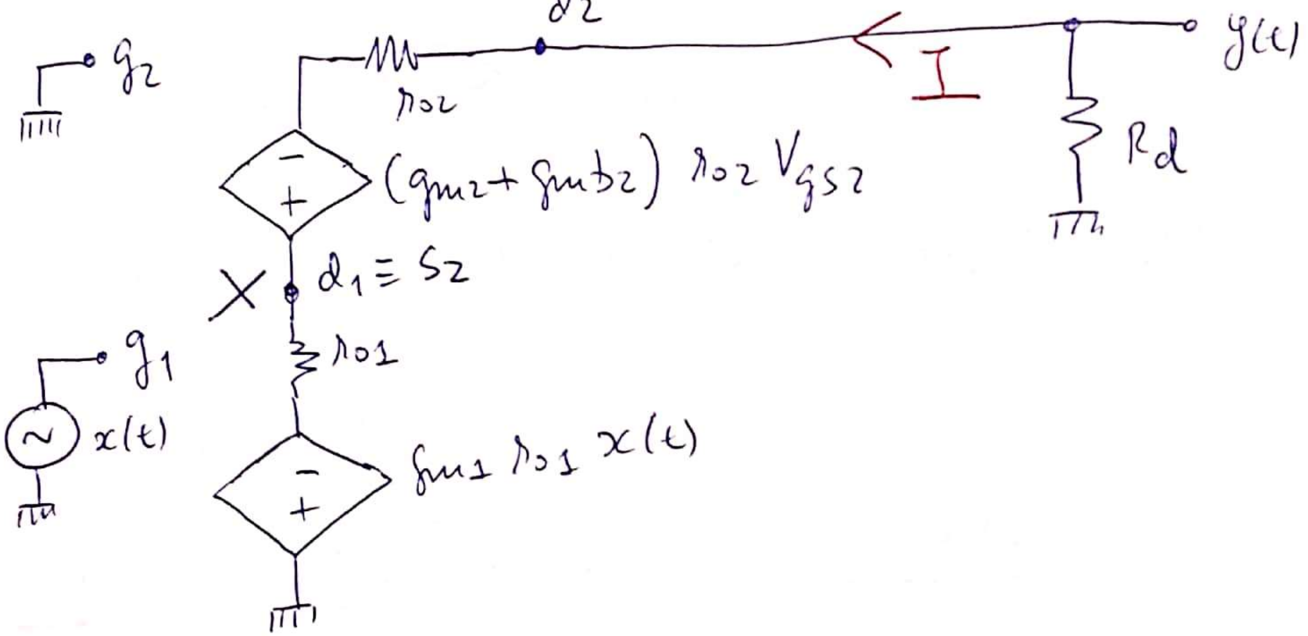


ENTÃO





FICANDO



NÓ X:

$$(g_{m2}+g_{mb2})\, r_{o2} V_{gs2} = -(g_{m2}+g_{mb2})\, r_{o2} V_X$$

$$V_X = -g_{m1} r_{o1} x(t) + r_{o1} I \quad (*)$$

$$y(t) = -R_d I \quad (**)$$

$$I = \frac{y(t) - V_x + (g_{m2} + g_{mb2}) r_{o2} V_{gs2}}{r_{o2}} = \frac{y(t) - V_x - (g_{m2} + g_{mb2}) r_{o2} V_x}{r_{o2}} =$$

$$= \frac{1}{r_{o2}} \left[y(t) - (1 + (g_{m2} + g_{mb2}) r_{o2}) . V_x \right]$$

SUBSTITUINDO V_x DE (*) AQUI :

$$I = \frac{1}{r_{o2}} \left[y(t) - (1 + (g_{m2} + g_{mb2}) r_{o2}) (- g_{m1} r_{o1} x(t) + r_{o1} I) \right]$$

ISOLANDO I FICA :

$$I = \frac{y(t) + g_{m1} r_{o1} [1 + (g_{m2} + g_{mb2}) r_{o2}] x(t)}{r_{o2} + r_{o1} [1 + (g_{m2} + g_{mb2}) r_{o2}]}$$

SUBSTITUINDO EM (**) E FAZENDO $A_V = y(t) / x(t)$ RESULTA EM:

$$A_V = - \frac{R_d \, g_{m1} r_{o1} [1 + (g_{m2} + g_{mb2}) r_{o2}]}{(R_d + r_{o2}) + r_{o1} [1 + (g_{m2} + g_{mb2}) r_{o2}]}$$

COMO $(g_{m2} + g_{mb2}) r_{o2} >> 1$ E $r_{o1} (g_{m2} + g_{mb2}) r_{o2} >> (R_d + r_{o2}) \Rightarrow A_V \simeq - R_d \, g_{m1}$