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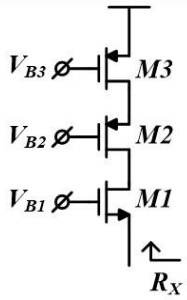
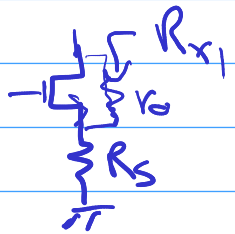
# Thursday Analog Quiz



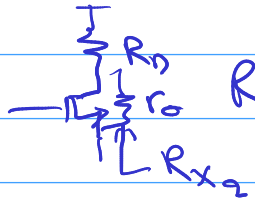

Assume M1, M2, and M3 have the same $g_m$ and $r_o$, $g_m r_o \gg 1$, and neglect body effect. Find $R_X$.

we know that:




$$R_{x_1} \approx g_m r_o R_S \quad \cdots (1)$$

and:




$$R_{x_2} \approx \frac{1}{g_m}\left(1+\frac{R_D}{r_o}\right) \quad \cdots (2)$$

using (1) and (2):

$$R_x = \frac{1}{g_m}\left(1+\frac{R_{D_1}}{r_o}\right) \text{ and } R_{D_1} \approx g_m r_o^2$$

$$R_x = \frac{1}{g_m}\left(1+\frac{g_m r_o^2}{r_o}\right) \approx r_o$$