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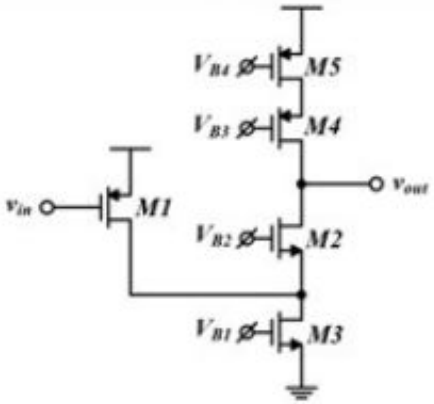
Thursday Analog Quiz



Assume all transistors have the same gm and ro, gm*ro >> 1, and neglect body effect. Calculate Av = Gm*Rout.

$$A_V = G_m \cdot R_{out}$$

$$G_m \approx g_{m1}$$

$$R_{out} = g_m r_o^2 \,//\, g_m r_o (r_o \,//\, r_o)$$

$$R_{out} = g_m r_o^2 \,//\, \frac{g_m r_o^2}{2}$$

$$R_{out} = \frac{g_m r_o^2 \cdot \frac{g_m r_o^2}{2}}{2 g_m r_o^2 + \frac{g_m r_o^2}{2}} = \frac{g_m^2 r_o^4}{3 g_m r_o^2} = \frac{g_m r_o^2}{3}$$

$$A_V = g_m \cdot \frac{g_m r_o^2}{3} = \frac{(g_m r_o)^2}{3}$$