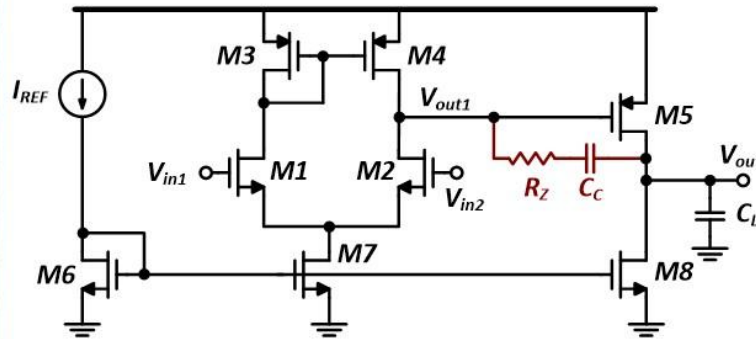




Thursday Analog Quiz



Assume all transistors are biased in SI and the square-law is valid. If I_{REF} is halved ($\times 0.5$), what happens to the PM (phase margin)?

this is a 2-poles system

first pole:

$$\omega_{p1} = \frac{1}{C_c R_{out1}} = \frac{G_{m1}}{C_c} = \frac{g_{m2}}{C_c}$$

$$\omega_{p2} = \frac{1}{C_L R_{out2}} = \frac{G_{m2}}{C_L} = \frac{g_{m5}}{C_L}$$

$$PM = 90 - \tan^{-1} \left(\frac{\omega_{p1}}{\omega_{p2}} \right)$$

As I_{REF} is halved, so I_{D2} then $g_{m2} \times \frac{1}{\sqrt{2}}$

So I_{D5} then $g_{m5} \times \frac{1}{\sqrt{2}}$

as $\frac{\frac{1}{\sqrt{2}}}{\frac{1}{\sqrt{2}}} = 1 \Rightarrow$ then PM will not change.