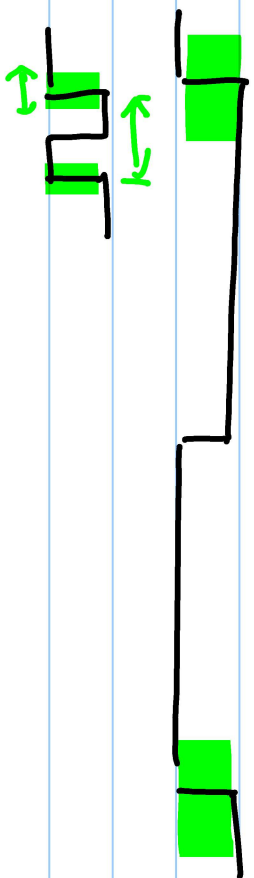


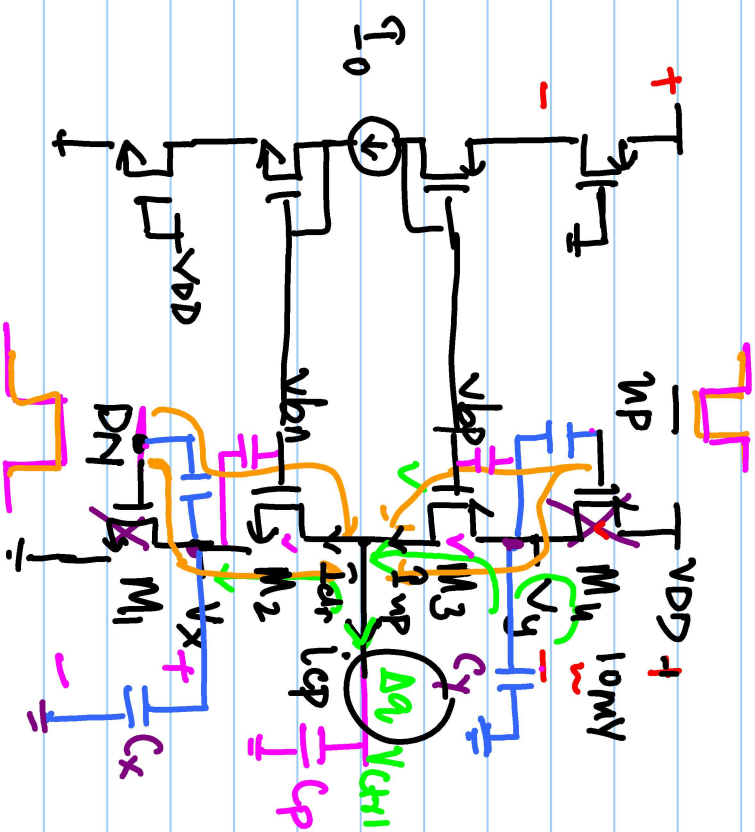
Lecture #31

$f_0 = 1 \text{ GHz} \xrightarrow{1/10} 10 \text{ ps}$

$f_0 = 10 \text{ GHz} \xrightarrow{1/10} 1 \text{ ps}$



Source-switched Charge - Pump:



- M_2, M_3 remain in saturation.

- $I_{mp} = I_{dn} = 100 \mu A$.

$1.8 \text{ V} \quad 1.7 \text{ qV} \quad 1.7 \text{ qV} \quad 100 \mu A$

$0 - 1 \text{ V} \quad W/L = 1/0.18 \quad 100 \mu A$

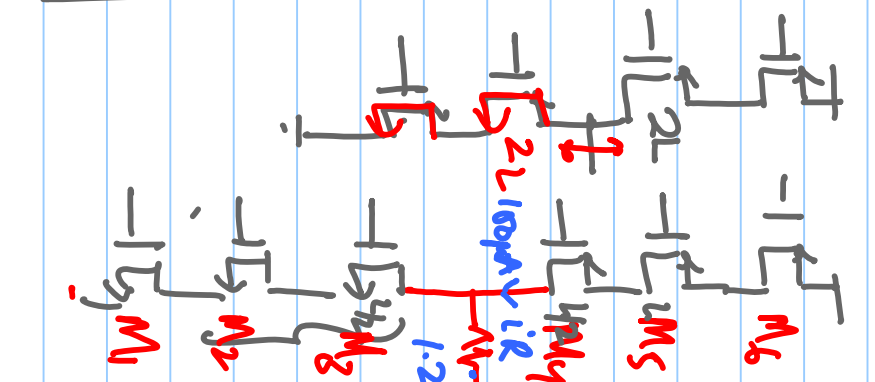
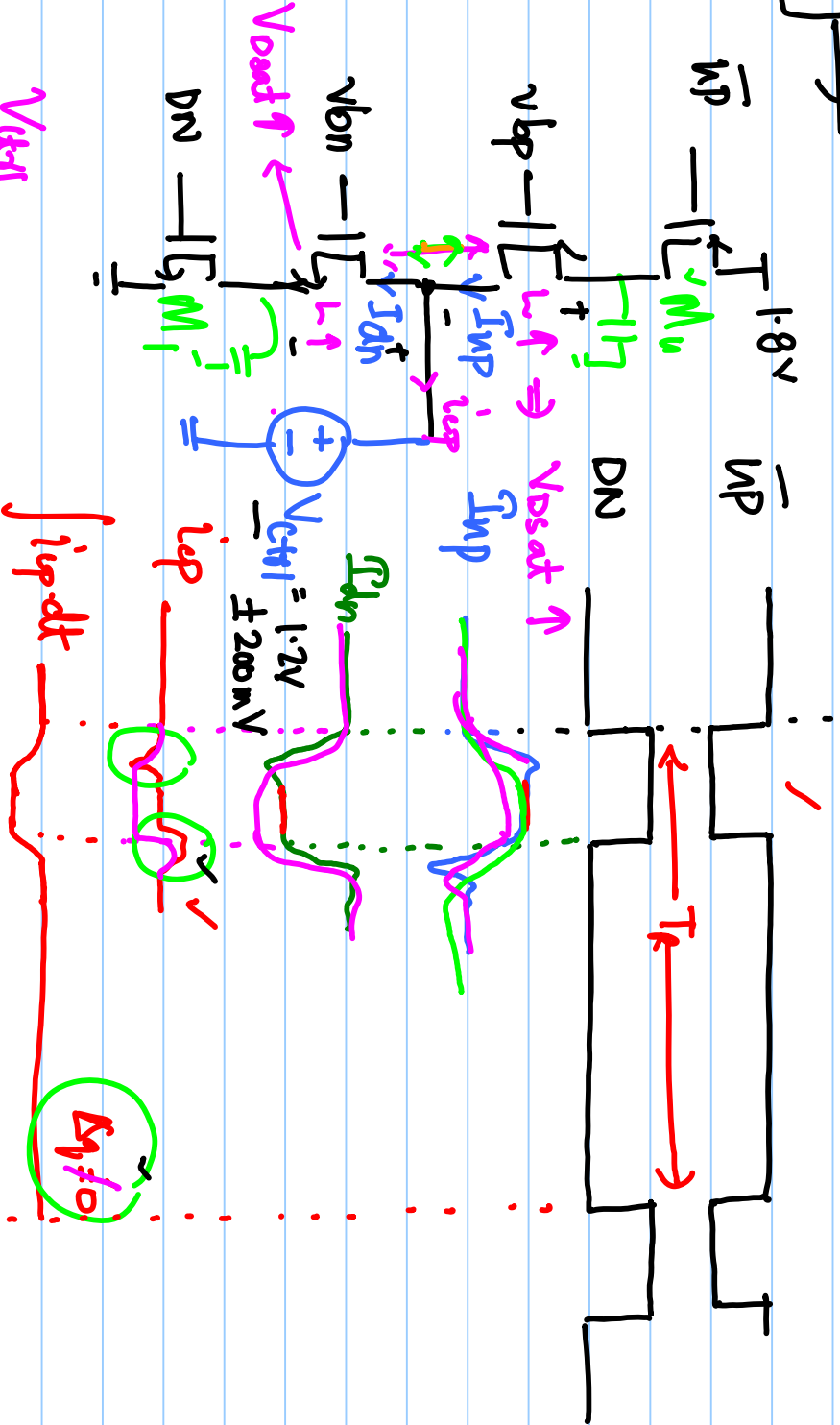
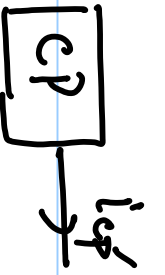
$1.7 \text{ qV} \quad 1.7 \text{ qV} \quad 100 \mu A$

$0 - 1 \text{ V} \quad W/L \quad 100 \mu A$

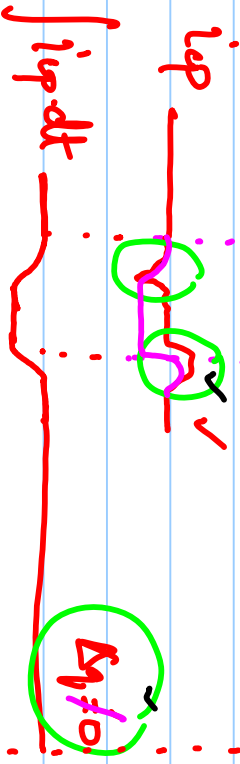
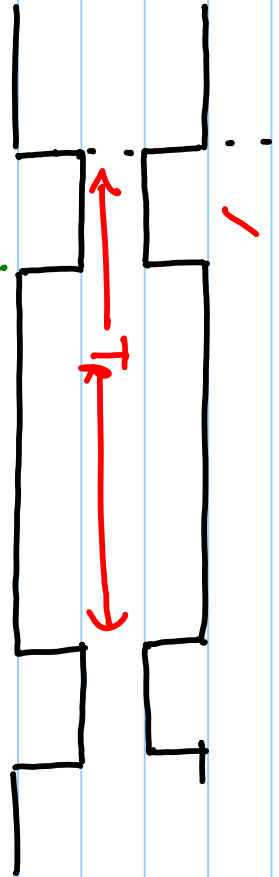
0.9 V

- clock feed through

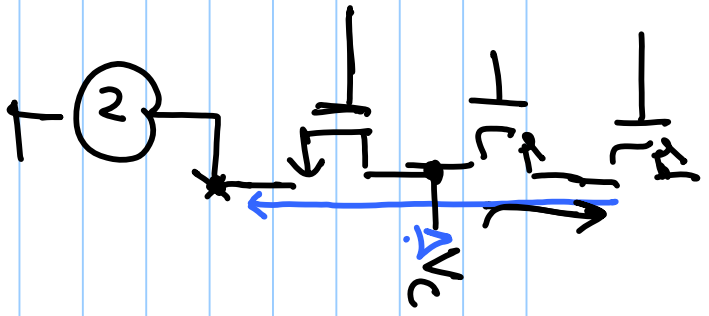
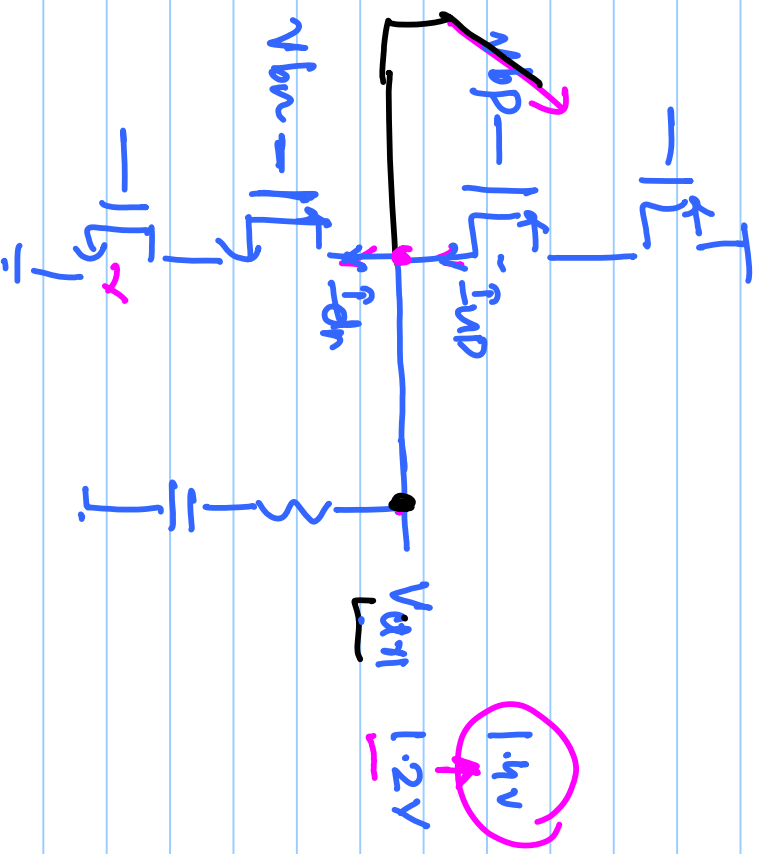
- V_x, V_y are charged / discharged $V_x \xrightarrow{V_{sp}} V_{bp} + |V_{tp}|$
 $V_y \xrightarrow{0} V_{bn} - |V_{tn}|$



$1.0V \leftarrow 1.2 \rightarrow 1.4V$
 \sim

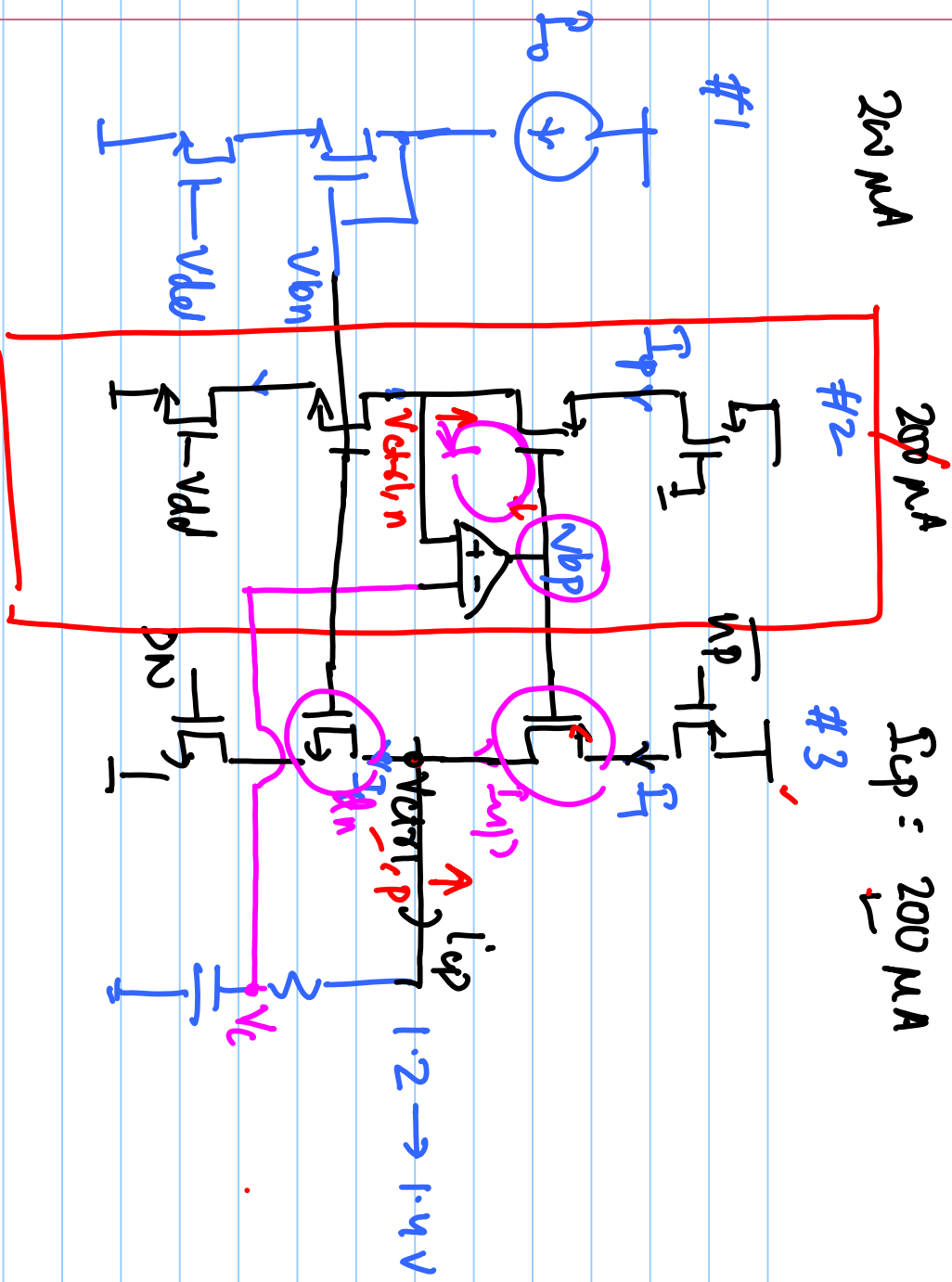


B_{yfo}

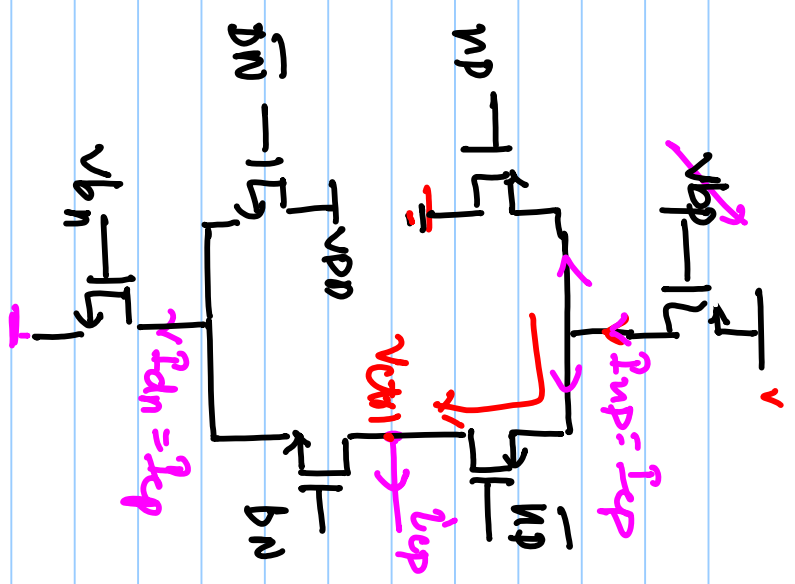


$$- I_{imp} = I_{dn} \quad \checkmark$$

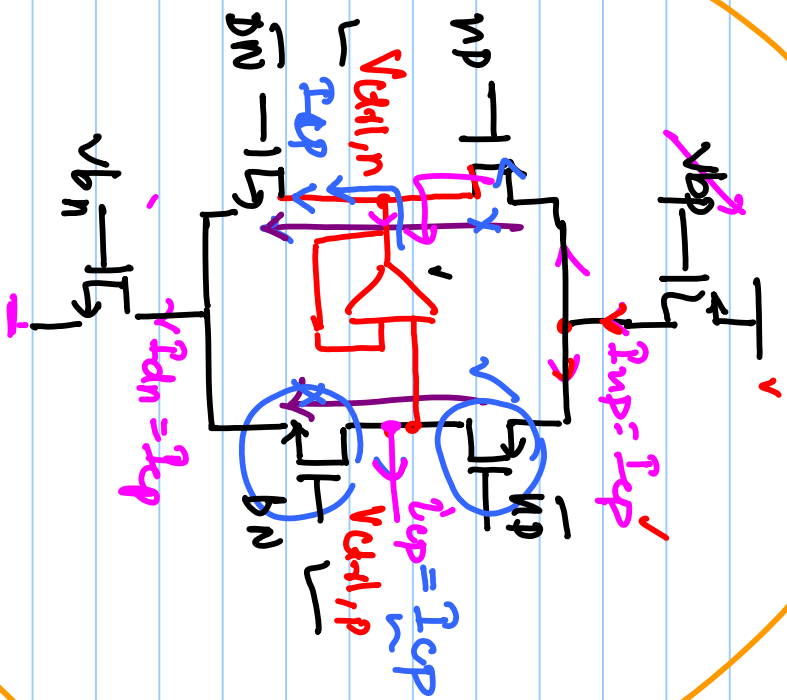
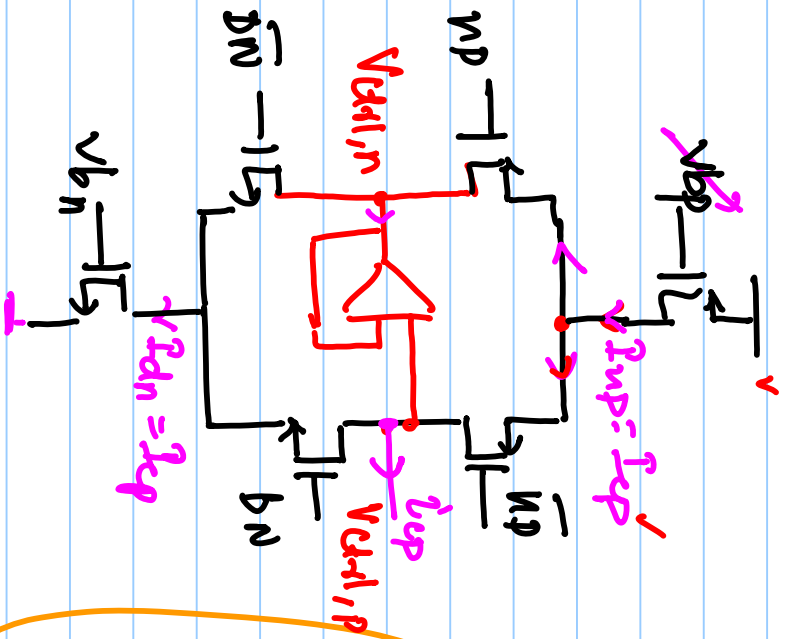
$$- I_{imp} = I_{dn} = I_{sp} (100 \mu A)$$

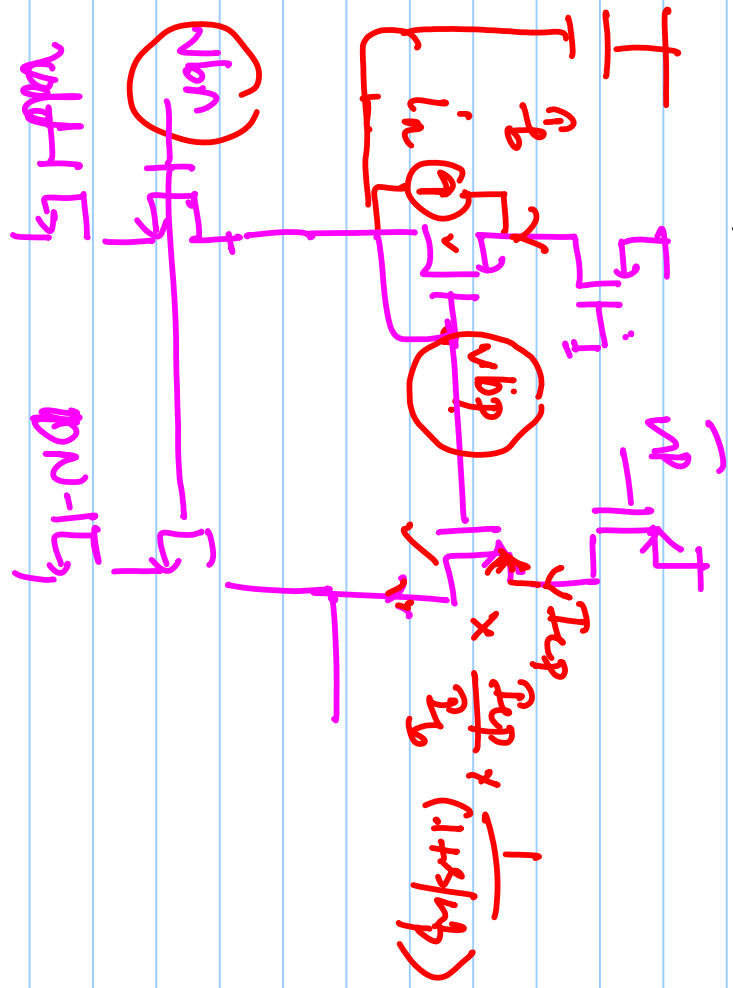
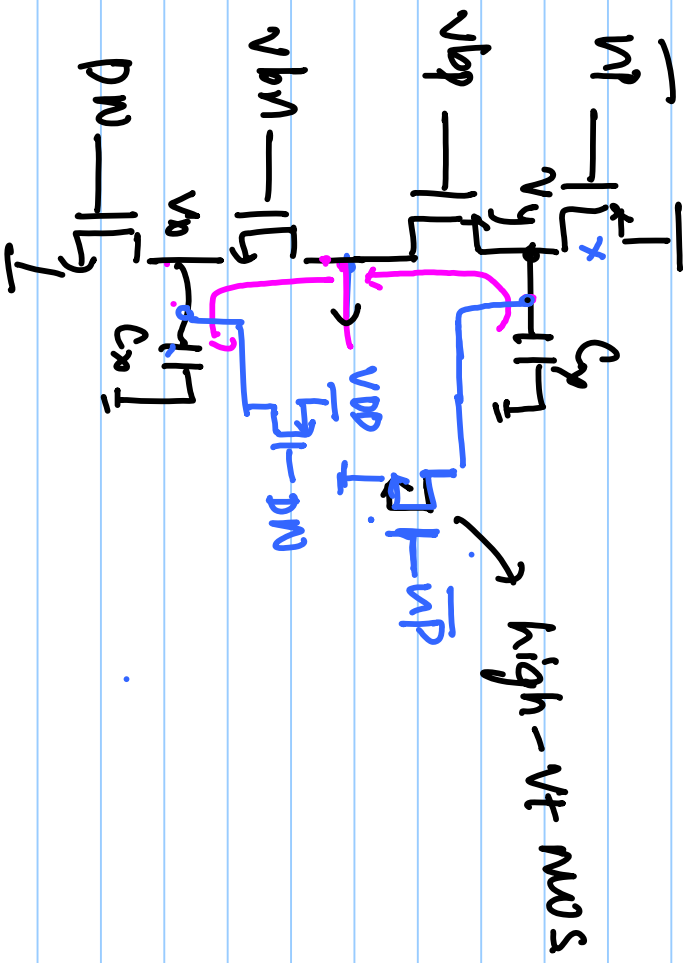
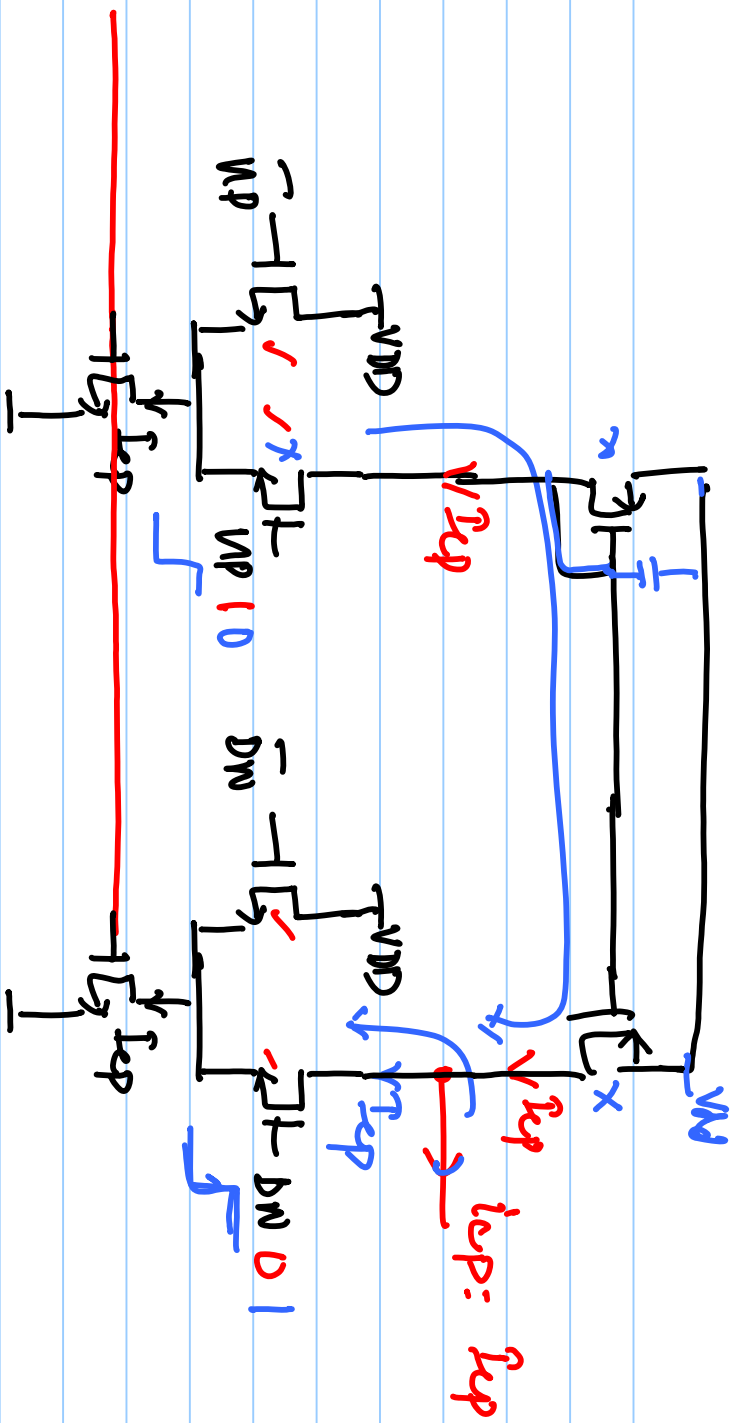


Consumes current only during T_{ov}



Constant current consumption





$$I_{Dp} = \frac{1}{2} \mu_p C_{ox} \frac{W_p}{L_p} (V_{DD} - V_{thp})^2$$