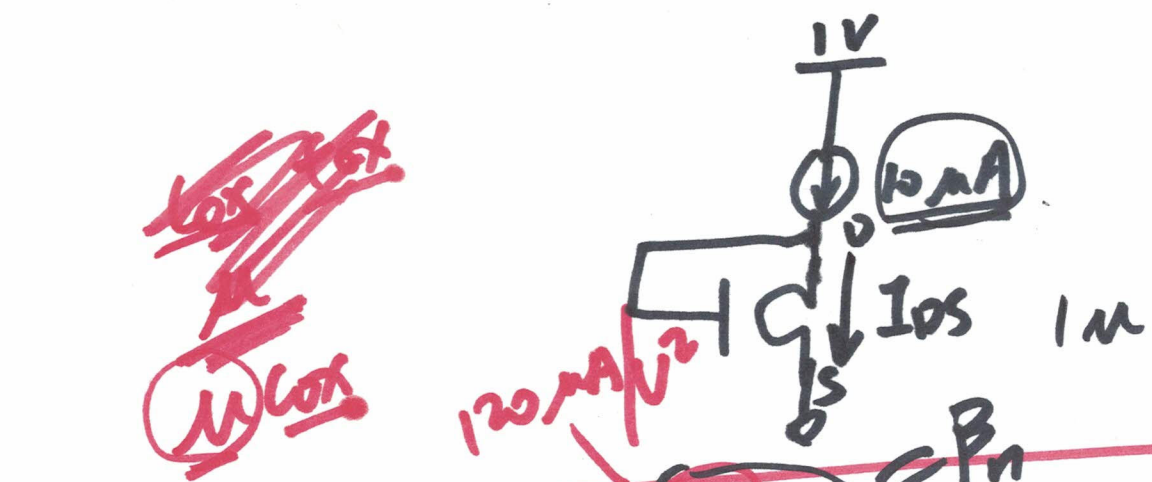
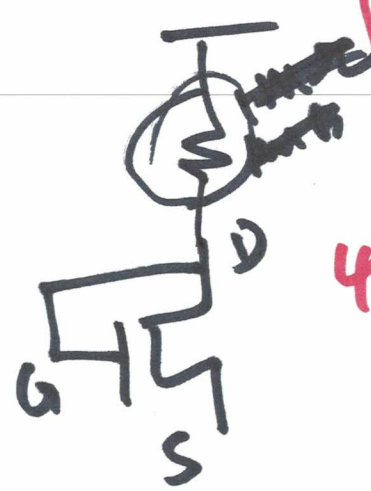


6



Bias

saturation region

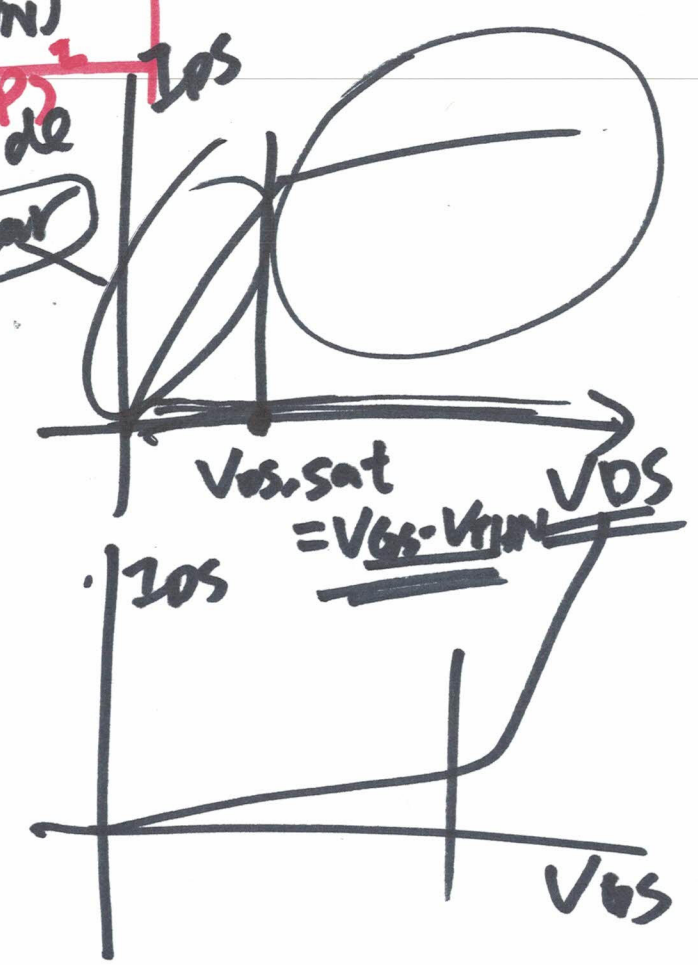


$40 \mu A/V^2$

$\frac{K_{Pn}}{2} \frac{W}{L} (V_{GS} - V_{THN})^2$

triode linear

$$V_{DS} \gg V_{DS,sat} \parallel V_{GS} \gg V_{GS} - V_{THN}$$



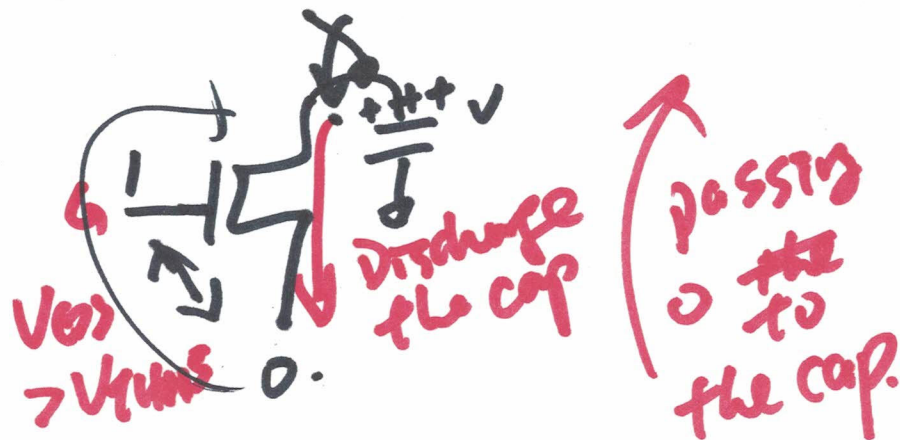
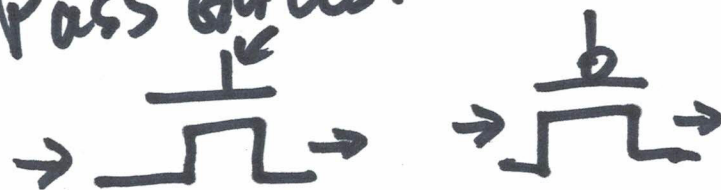
$$\underline{\underline{V_{GS} = \sqrt{\frac{2I_{OS}}{P_n}} + V_{thN}}}$$

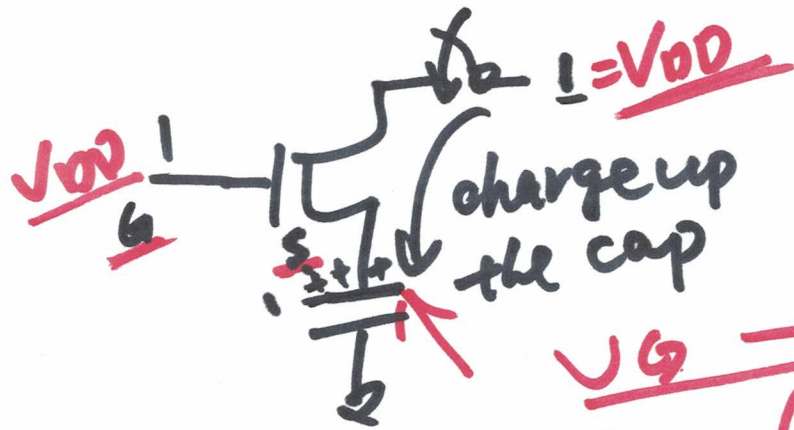
## The Inverter

Complementary MOS = CMOS

{ PMOS is good at passing VDD  
 { NMOS is good at passing GND

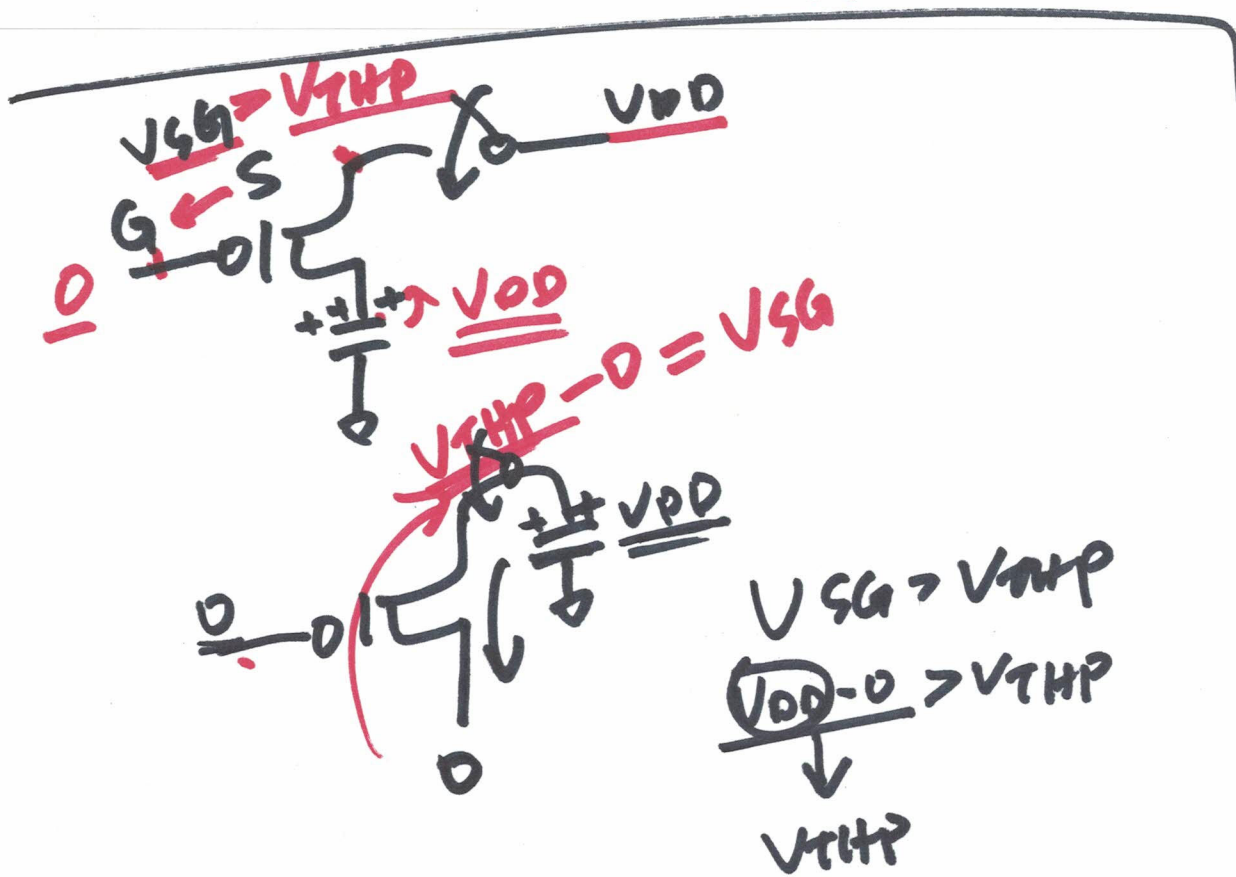
△ Pass Gates:





$$V_{GS} > V_{THN}$$

$$V_{GS} - V_S = V_{GS} - (V_{DD} - V_{THN}) = V_{THN}$$



$$V_{GS} > V_{THP}$$

$$\frac{V_{DD} - 0}{V_S} > V_{THP}$$

$$\downarrow$$

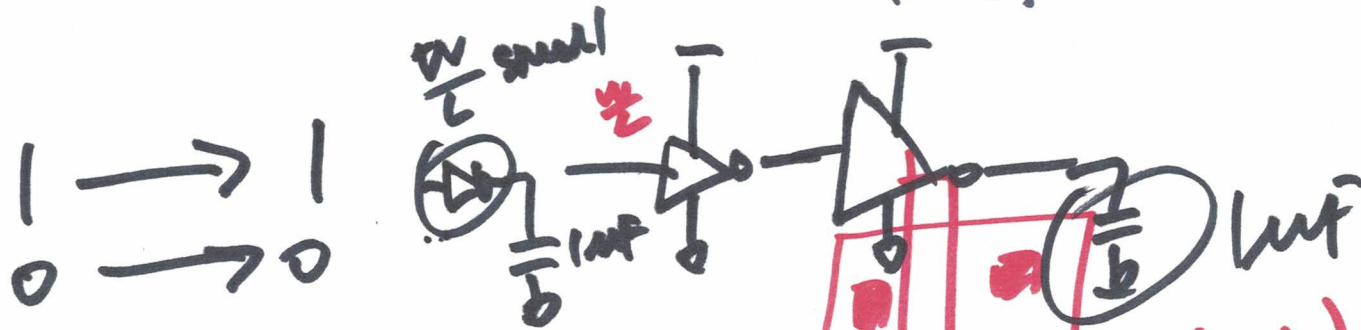
$$V_{THP}$$

$$\frac{V_{DD} - V_{THN}}{V_S}$$

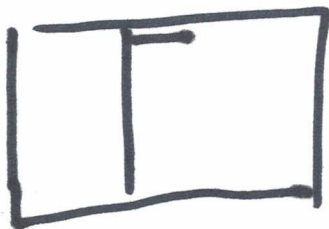
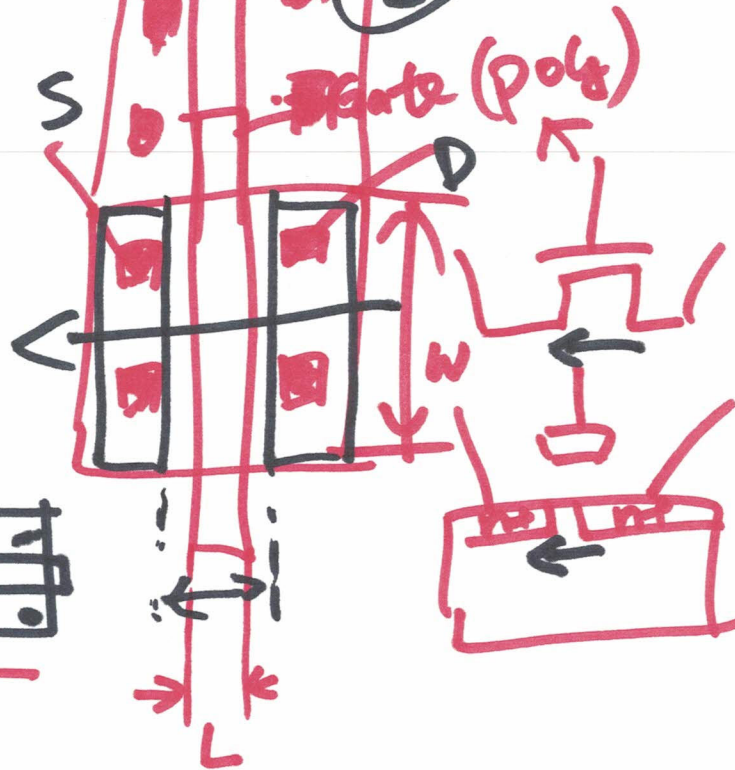
↑

△ Transmission Gates

Buffers

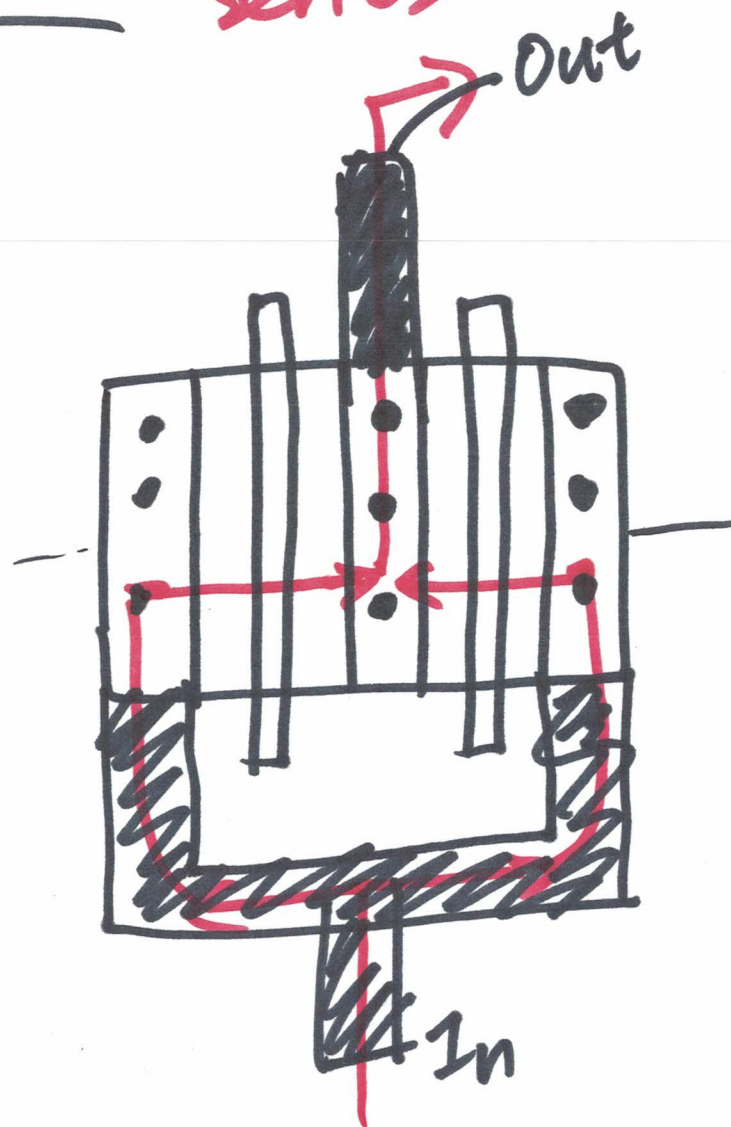
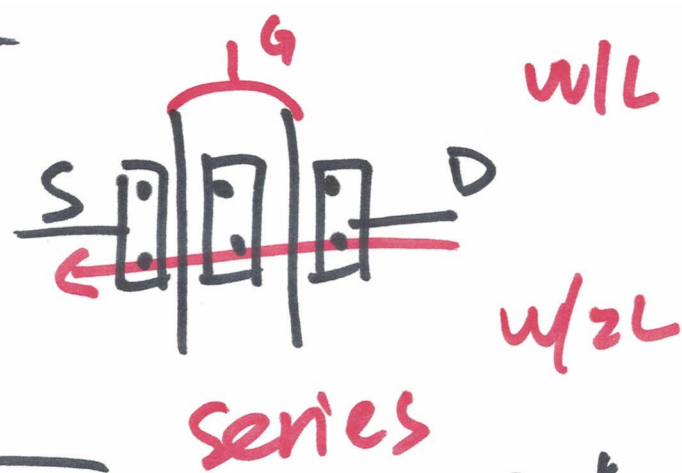
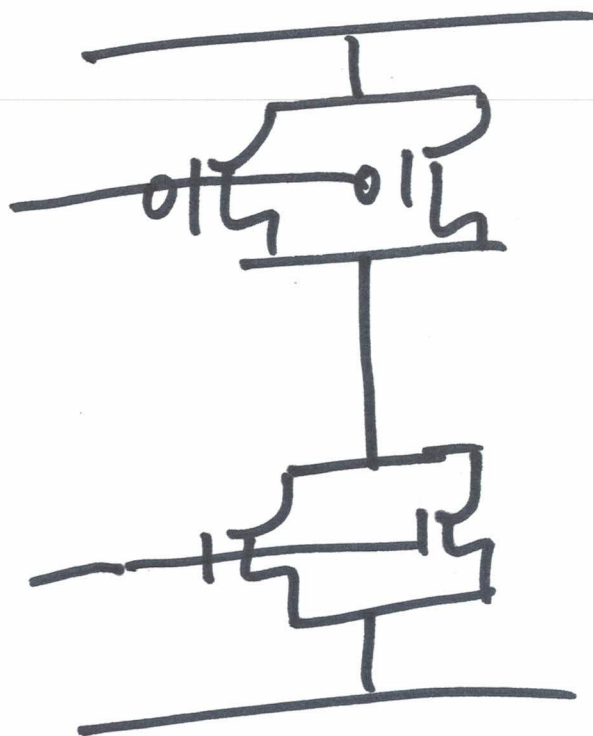
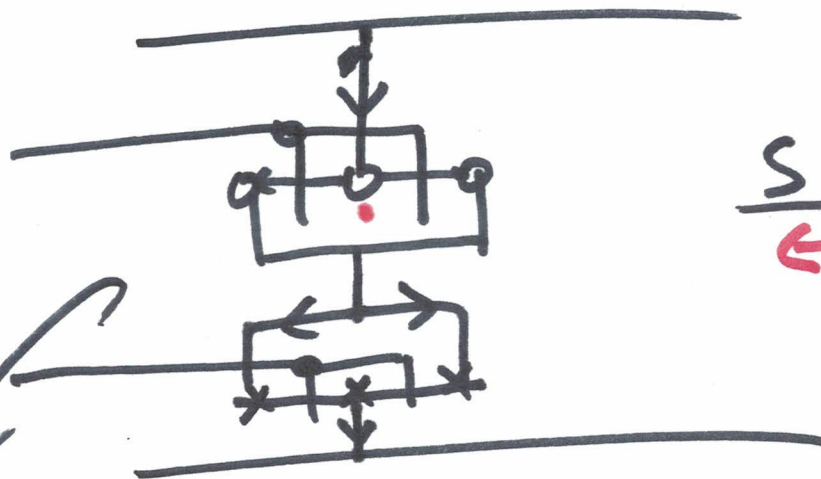


$\frac{1}{2} V_{DD}$

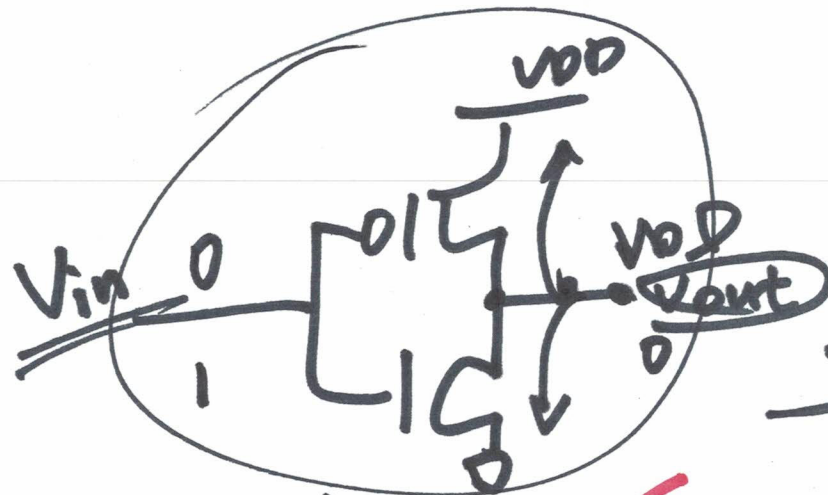
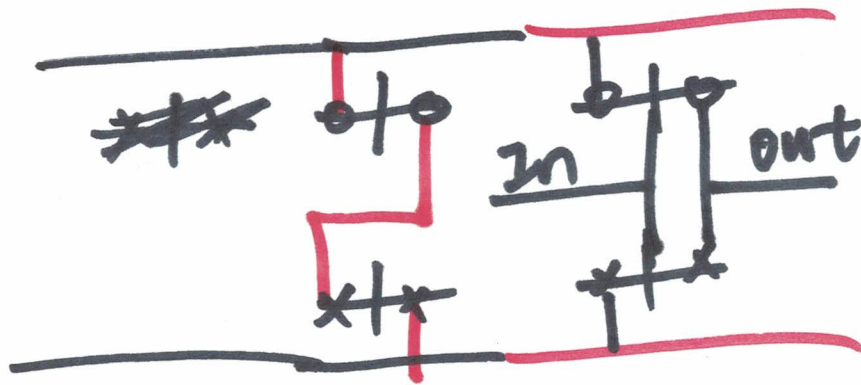




Stick  
Diagram



④



. de  $V_{in} = 0.5$

