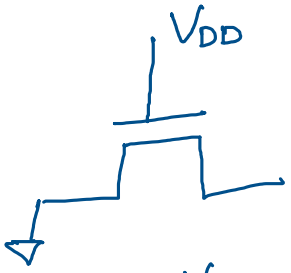
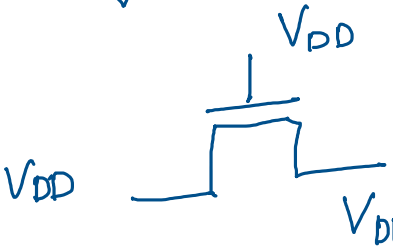
Pass Transistor DC characteristics :-

nMOS passes '0' well

'1' poorly



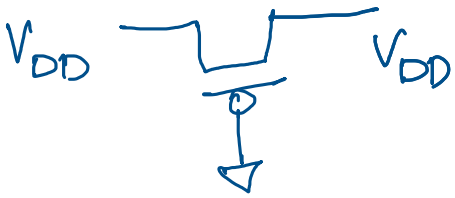
$\Rightarrow V_s = 0\ V$



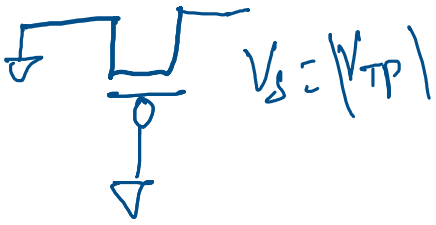
$\Rightarrow V_s = V_{DD} - V_{TH}$

PMOS passes '1' well

'0' poorly

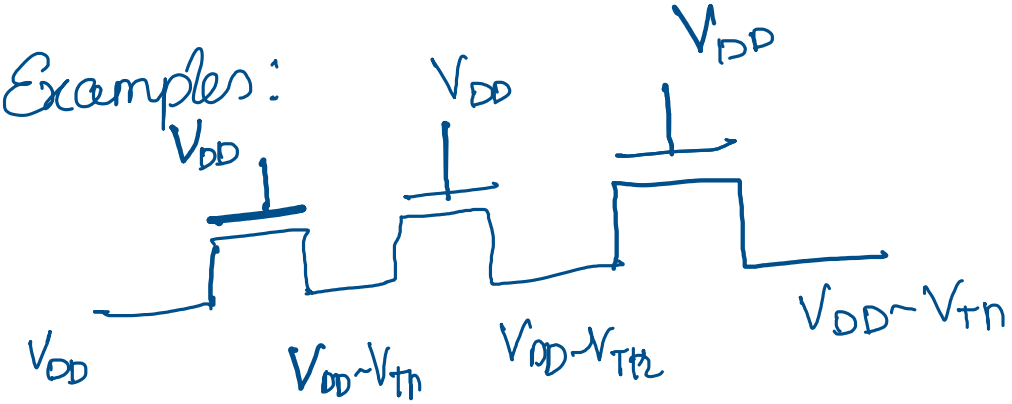


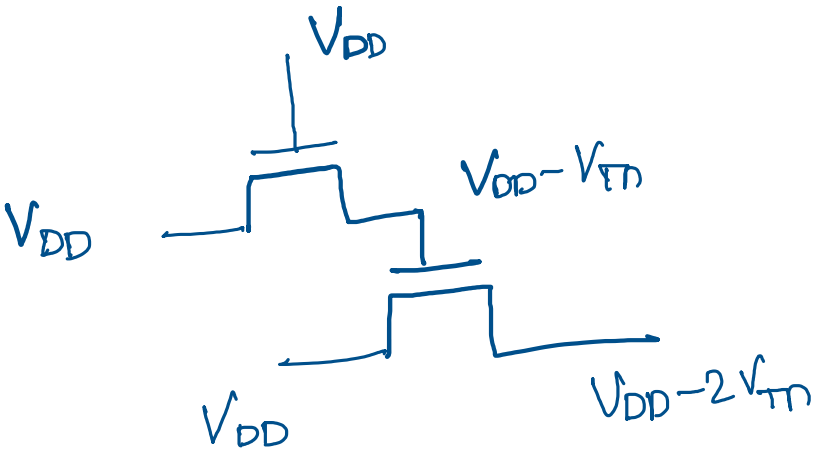
$\Rightarrow V_s = V_{DD}$



$\Rightarrow V_s = |V_{tp}|$.

Examples:





Pass transistors :-

nMOS perfect switch in passing '0'

Strong '0'

nMOS is imperfect at passing '1' less than V_{DD} by a threshold

degraded or weak '1'

pMOS has opposite behaviour

pMOS perfect switch in passing '1'

Strong '1'

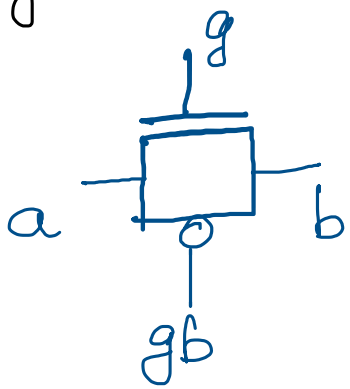
pMOS is imperfect at passing '0' it should have one V_{tp} at source

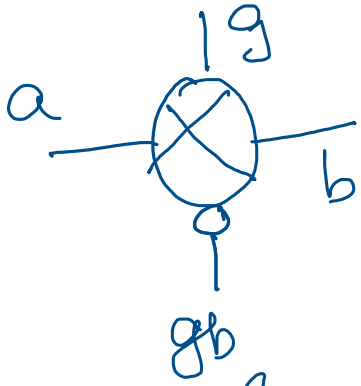
degraded or weak '0'.

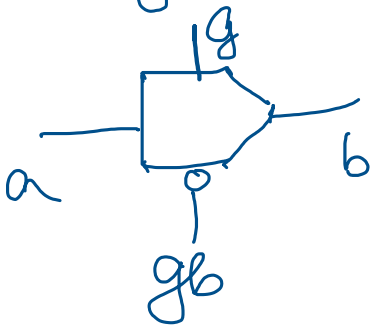
When nMOS or pMOS is used alone as an imperfect switch, we call it pass transistor.

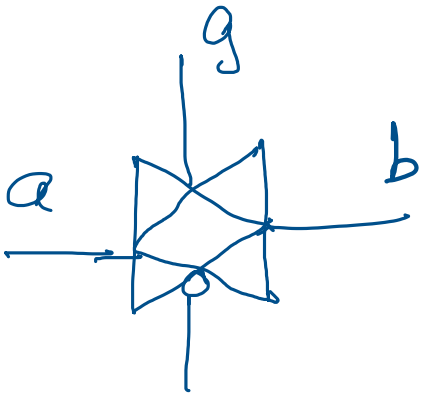
Transmission gate :- (TG) or pass Gate (PG)

Combining an nMOS and pMOS in parallel we obtain a switch that turns on when a 1 is applied to g in which 0s and 1s are both passed in acceptable fashion. This is called double rail logic









g=0, gb=1

g=1, gb=0

g=1, gb=0