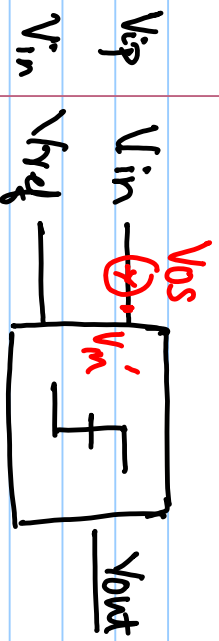


# Lecture # 42

## Comparator



— high,

— low,

$$V_{in} = V_{ref} + 10mV - \underbrace{20mV}_{V_{os}} = V_{ref} - 10mV$$

$$V_{in} = V_{ref} + 500mV$$

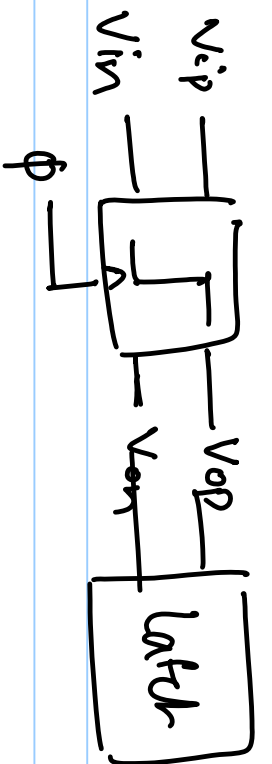
$$V_{in} > V_{ref}$$

— Comparator Non-linear

$$V_{in} < V_{ref}$$

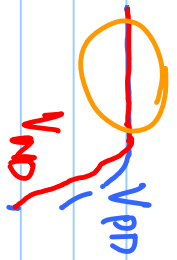
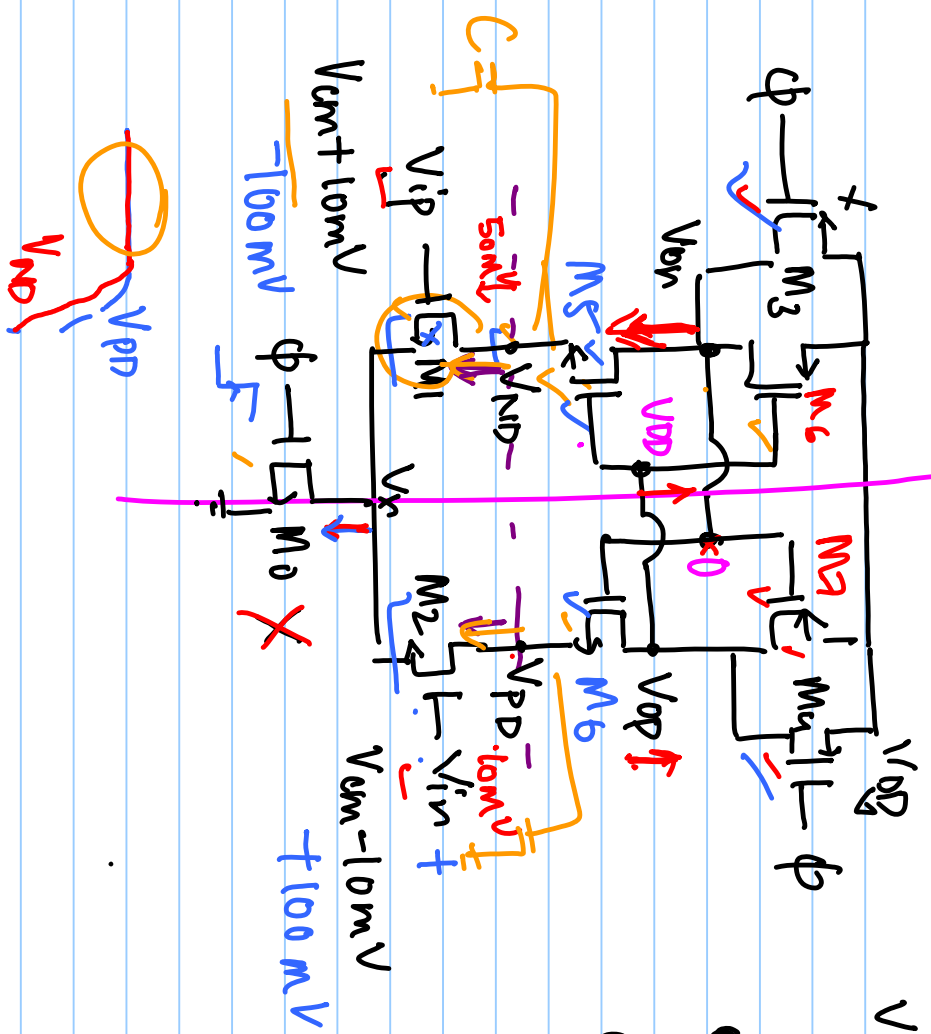
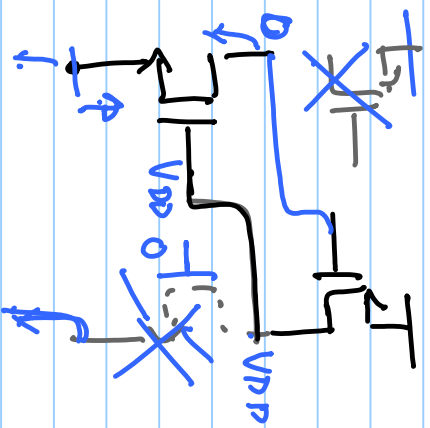
— Input reversed offset.

$$V_{in} = V_{ref} \} \text{ meta-stability.}$$

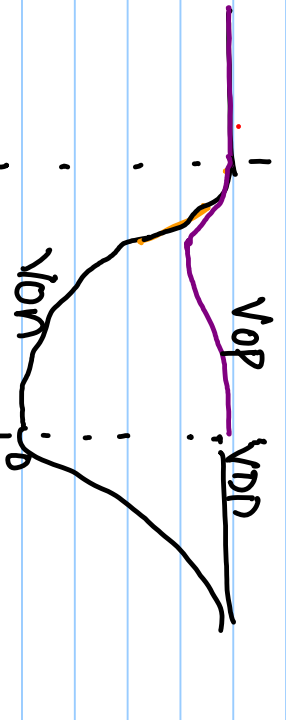


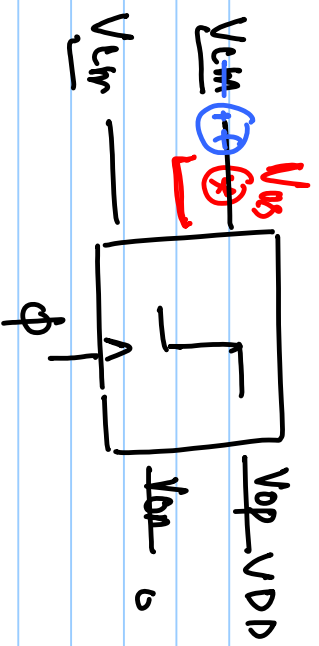
$\phi$  is low (0)  $\rightarrow V_{op} = V_{on} = V_{DD}$

$\phi$  is high



$\rightarrow t$





Transient Simulation

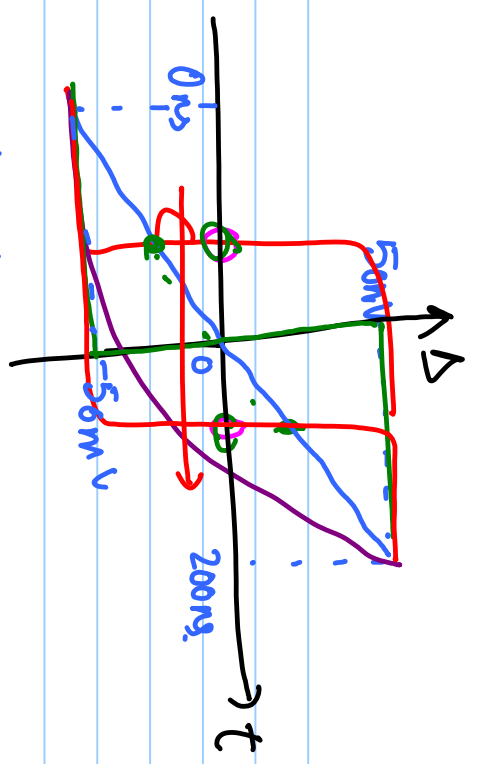
Monte-carlo simulation - (#loops)

$V_{op} - V_{on}$

$V_{ip} = V_{m} + \Delta$

$V_{in} = V_{m} - \Delta$

$f_{clk} = 1 \text{ GHz}$



$\frac{100 \text{ mV}}{200 \text{ ns}} = 0.5 \text{ mV}$

tran1 -  $V_{os1}$   
 tran2 -  $V_{os2}$

std.  $\rightarrow$

$V_{in,os}$

$V_{os,1000}$

