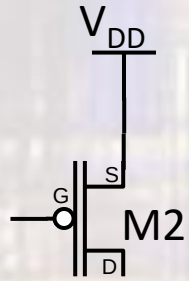
C-MOS Inverter

Last updated 1/6/25

C-MOS Inverter

- MOSFET Digital Configuration
  - Nominal source connections



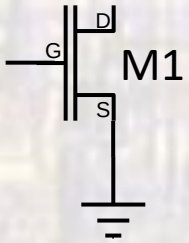
P-Channel

V_G low:

M2 is ON → $M2_D = V_{DD}$

V_G high:

M2 is OFF → $M2_D$ = open



N-Channel

V_G low:

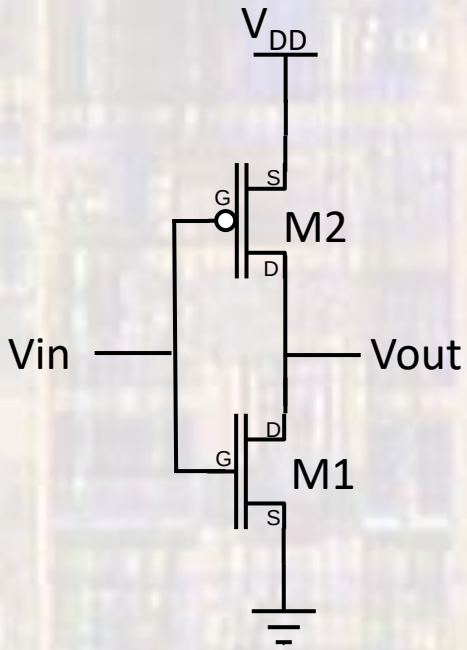
M1 is OFF → $M1_D$ = open

V_G high:

M1 is ON → $M1_D$ = Gnd

C-MOS Inverter

- MOSFET Digital Configuration – Inverter
  - Inverts the logical value of the input



Vin low:

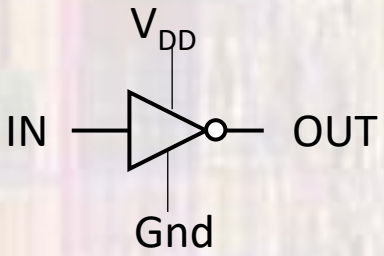
M2 is on → $M2_D = V_{DD}$
M1 is off → $M1_D$ = open
Vout = V_{DD}

Vin high:

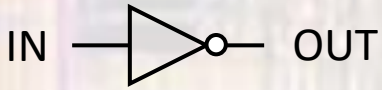
M2 is on → $M2_D$ = open
M1 is off → $M1_D$ = Gnd
Vout = Gnd

C-MOS Inverter

- C-MOS Inverter
  - Circuit Symbol



  - Logic Symbol

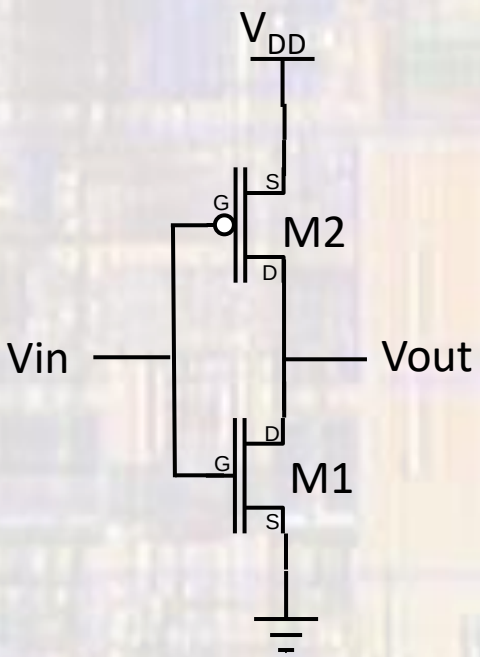


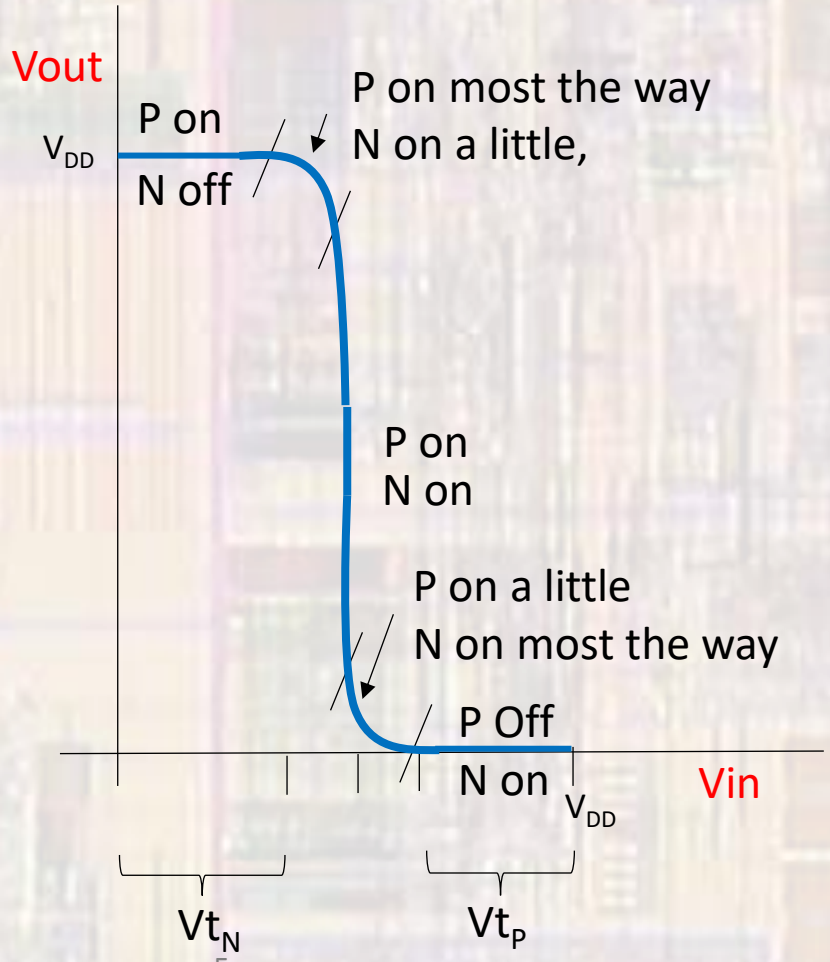
  - Truth Table (logic)

IN	OUT
0	1
1	0

C-MOS Inverter

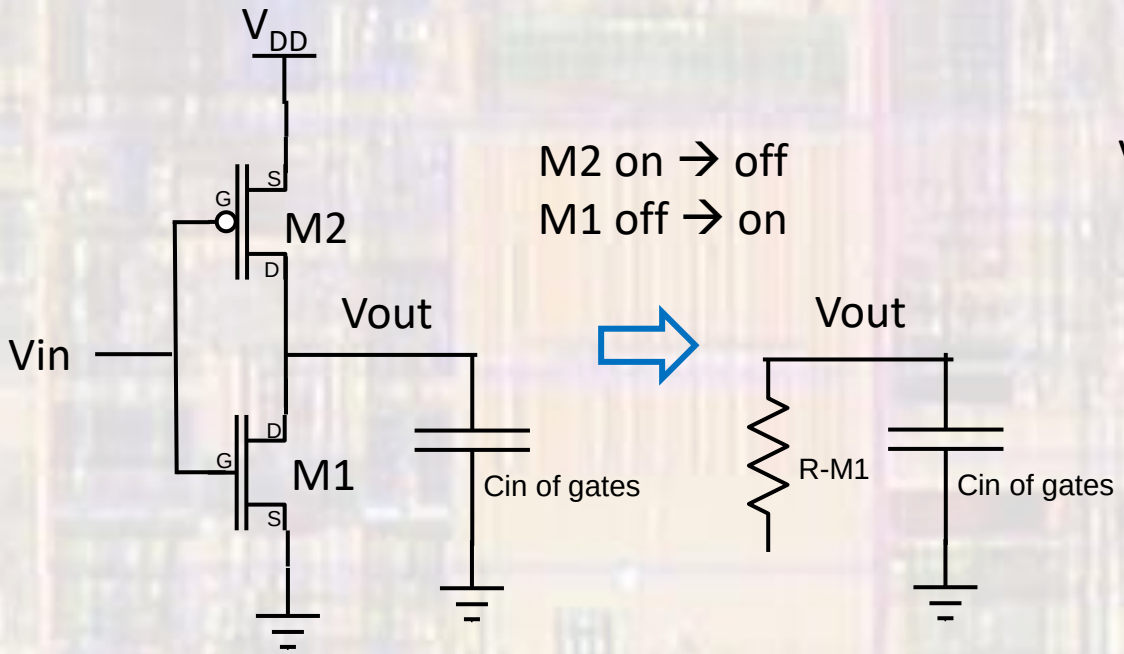
- Inverter – Qualitative – DC Transfer Characteristics

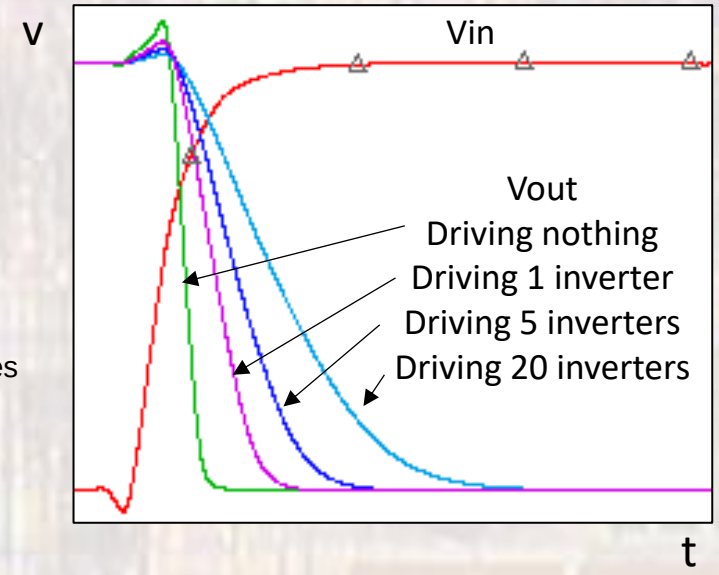




C-MOS Inverter

- Inverter – Qualitative – Transient Characteristics
  - Vin: 0 → 1



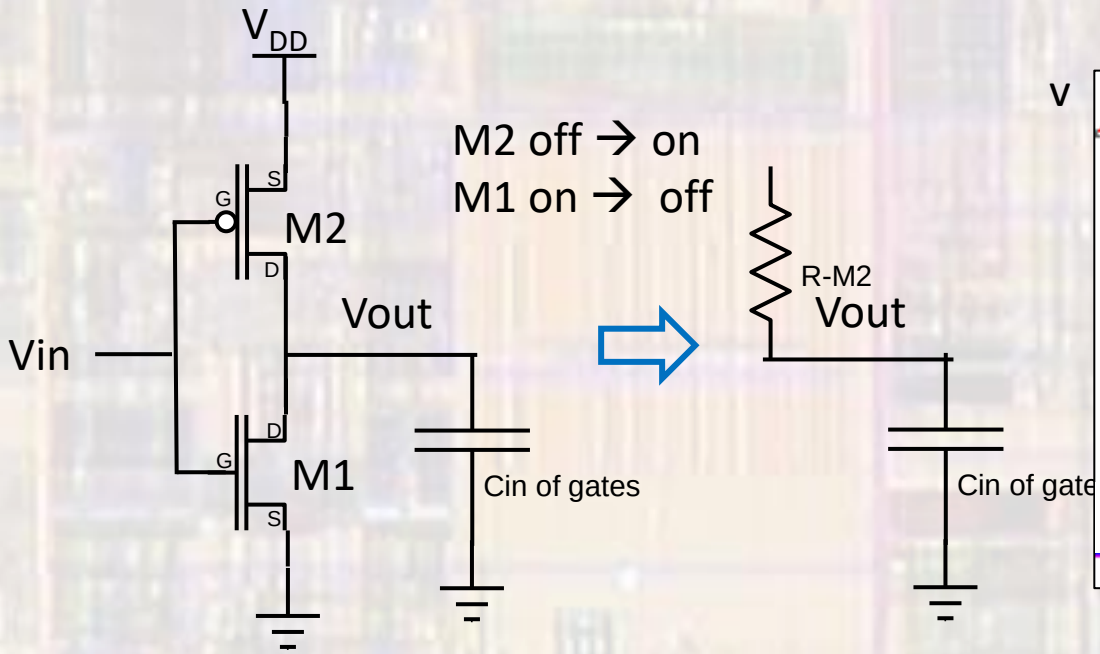


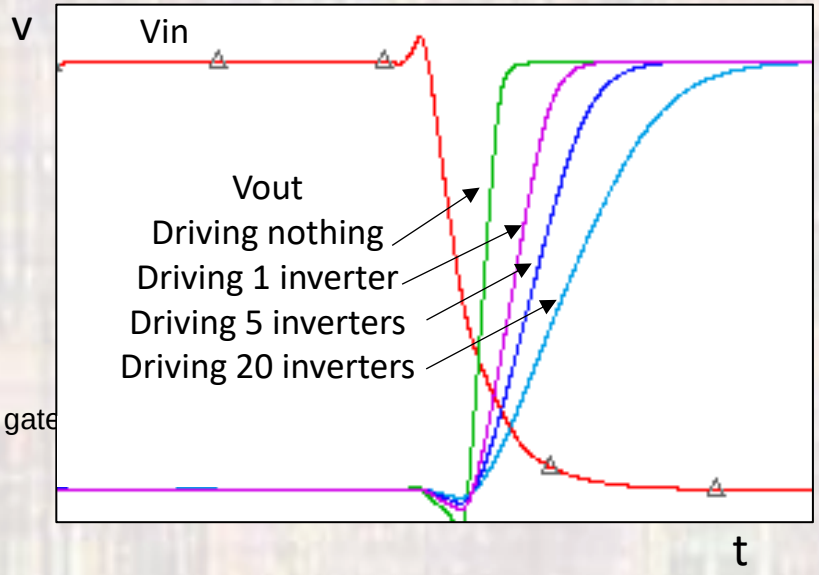
RC Time Constant

$R_{M1}\ C_{load}$

C-MOS Inverter

- Inverter – Qualitative – Transient Characteristics
  - Vin: 1 → 0





RC Time Constant

$R_{M2}\ C_{load}$