COL215L: Digital Logic & System Design

Lecture 5: CMOS Circuits (Cont.)

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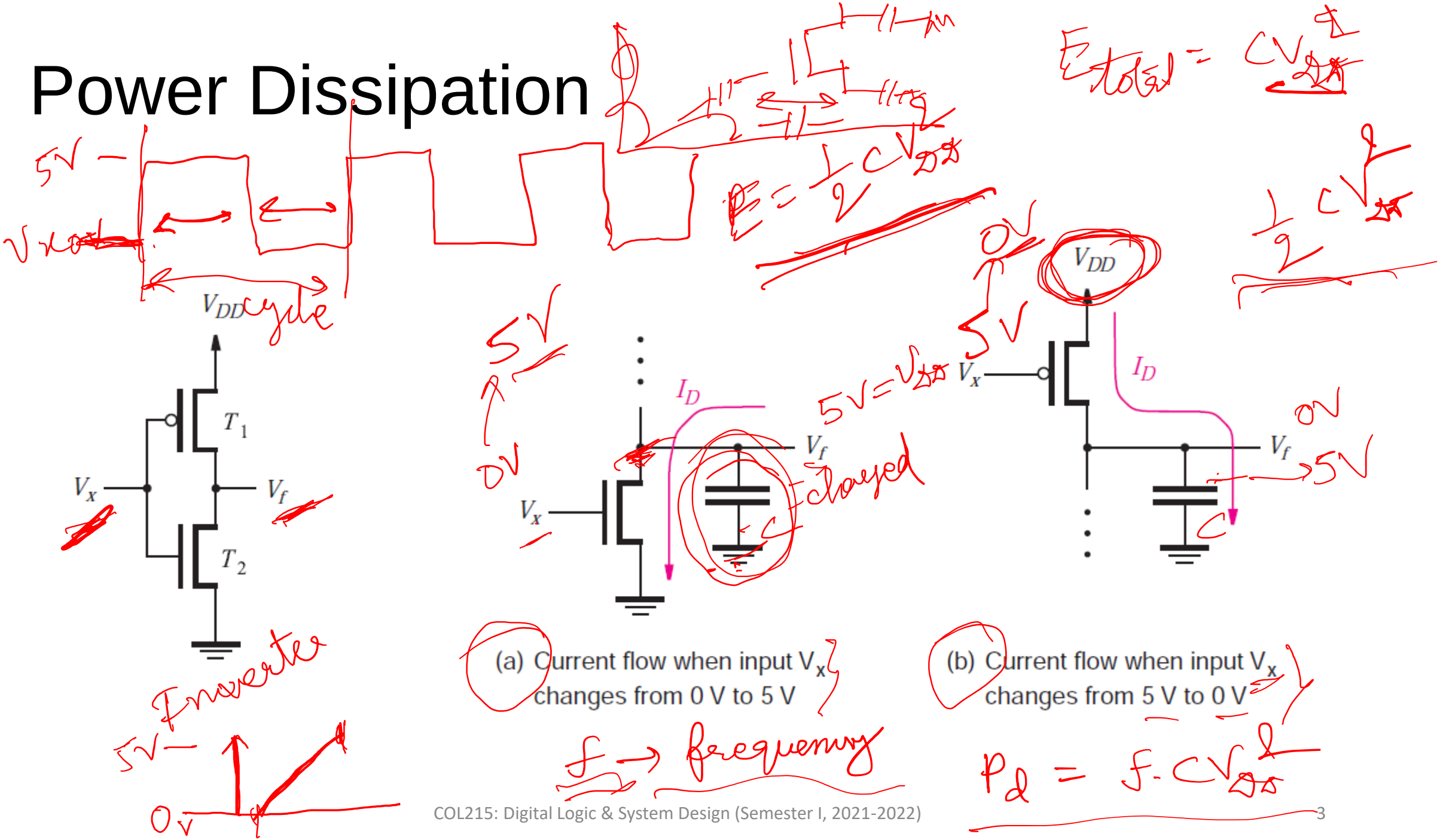
Agenda

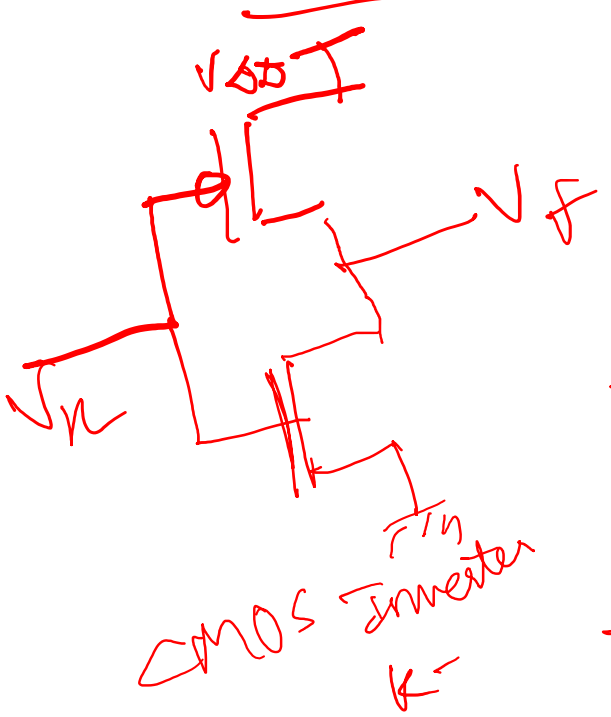
- Previously
  - Dynamic behavior
  - Propagation delay

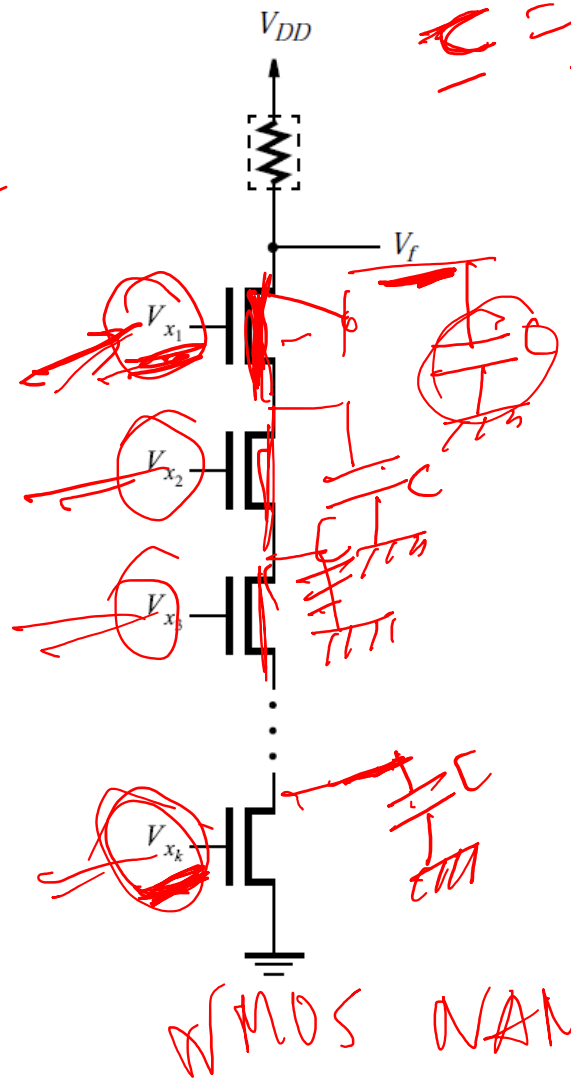
- Today
  - Power dissipation
  - Fan-in and fan-out limitations

Power Dissipation

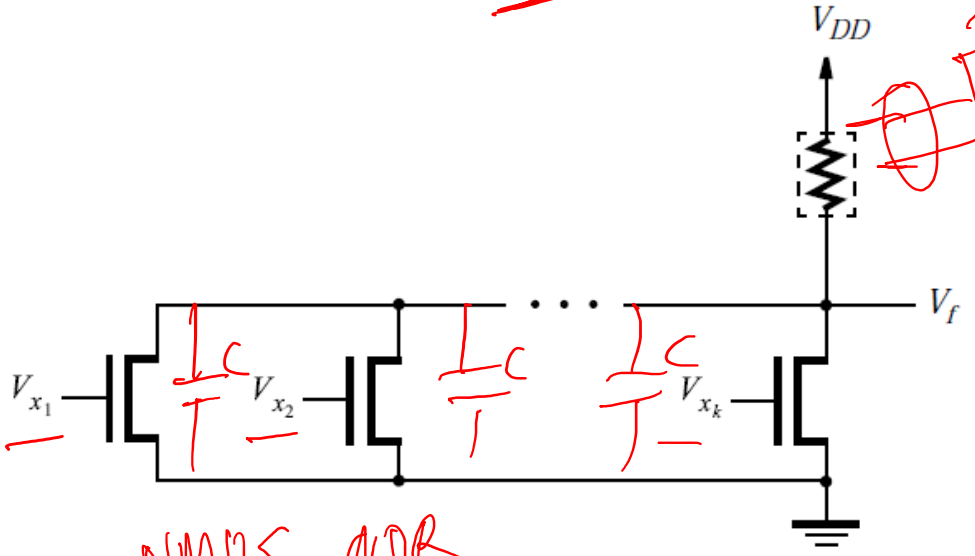


Impact of High Fan-in



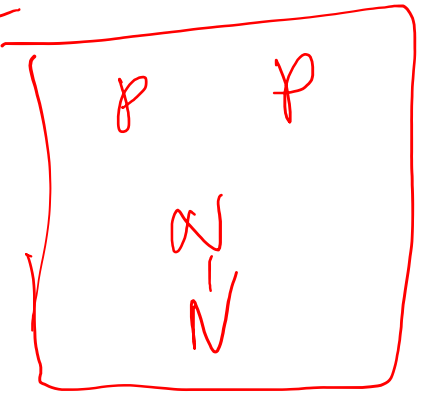


NMOS NAND

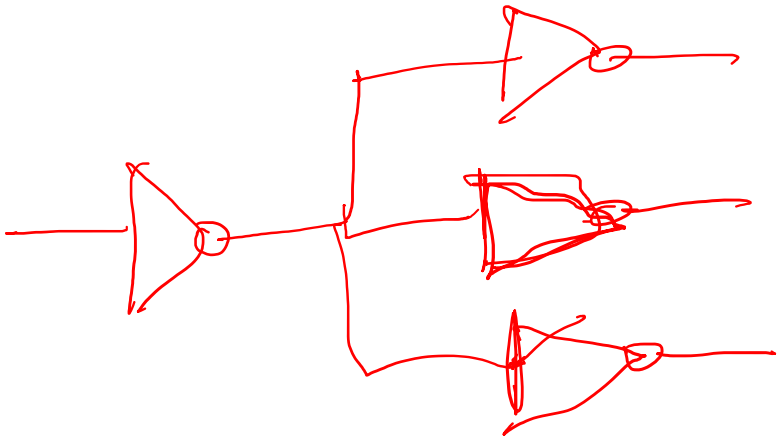


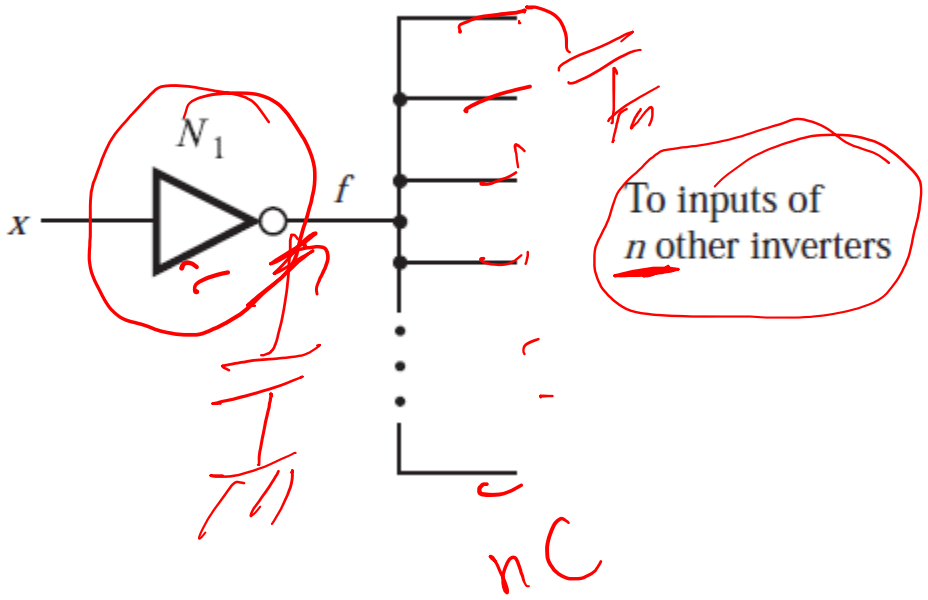
NMOS NOR

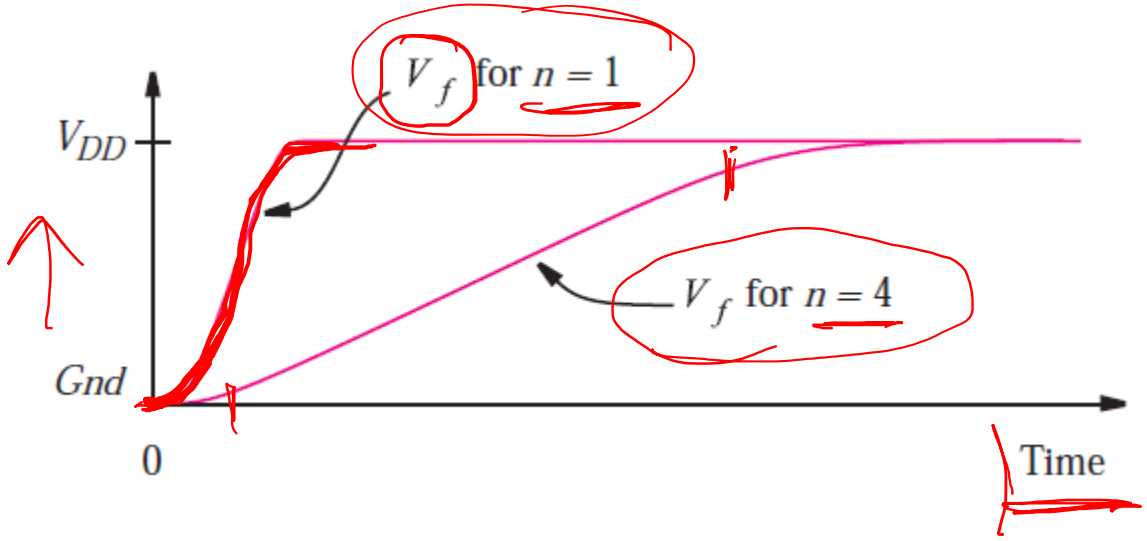
CMOS



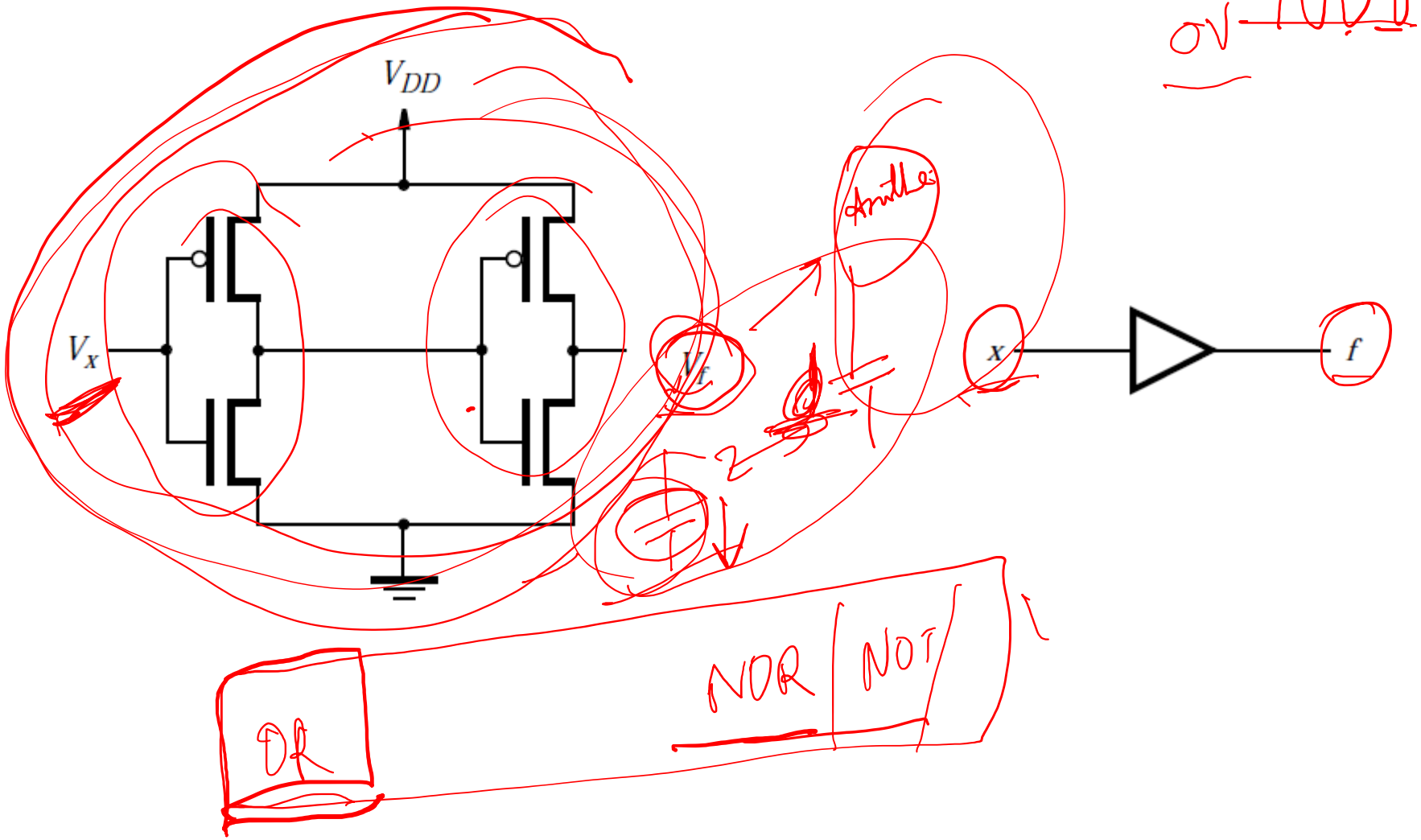
Impact of High Fan-out



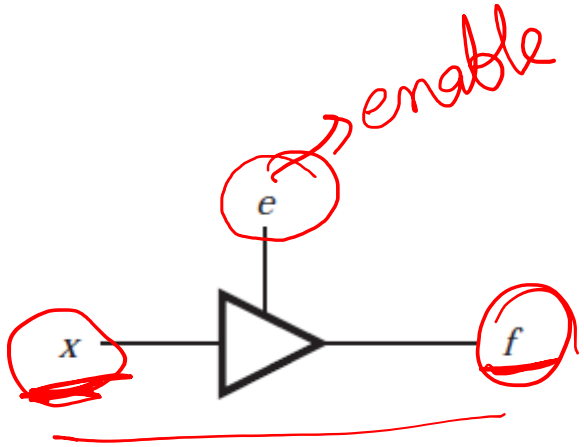




Buffers

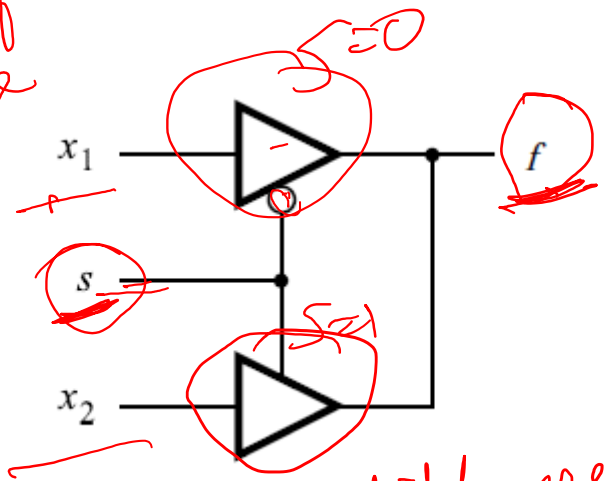


Tri-state Buffer



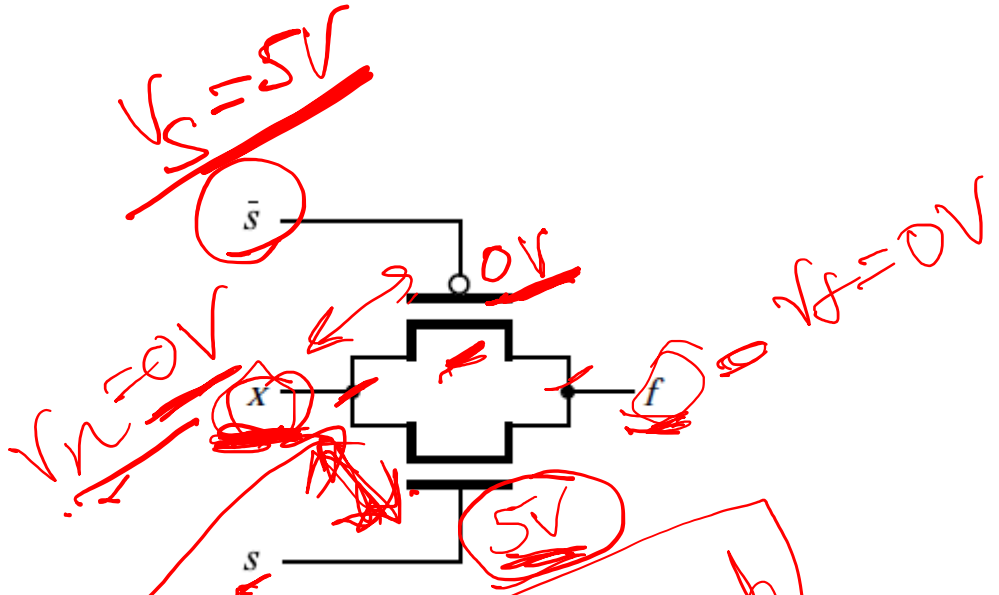
e	x	f
0	0	Z
0	1	Z
1	0	0
1	1	1

floating state

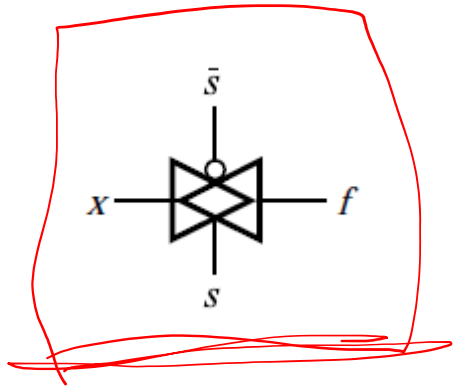


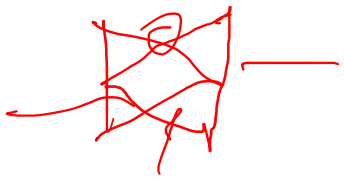
multiplexer

Transmission Gate



s	f
0	Z
1	x





XOR Gate