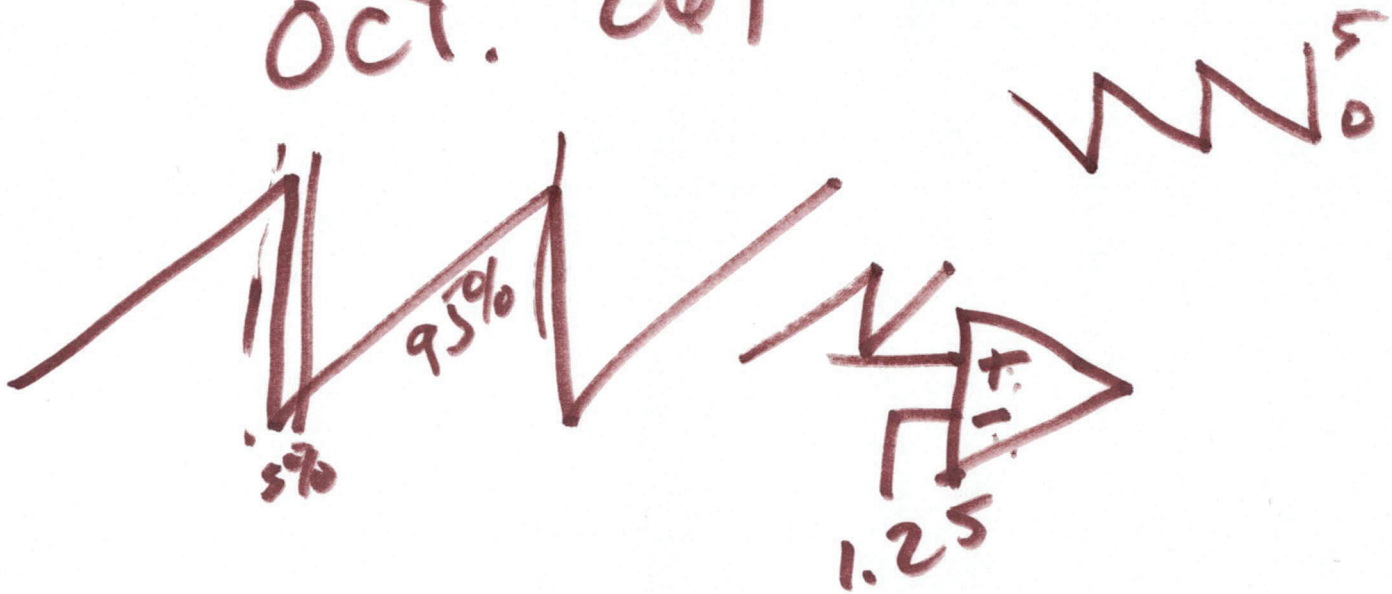
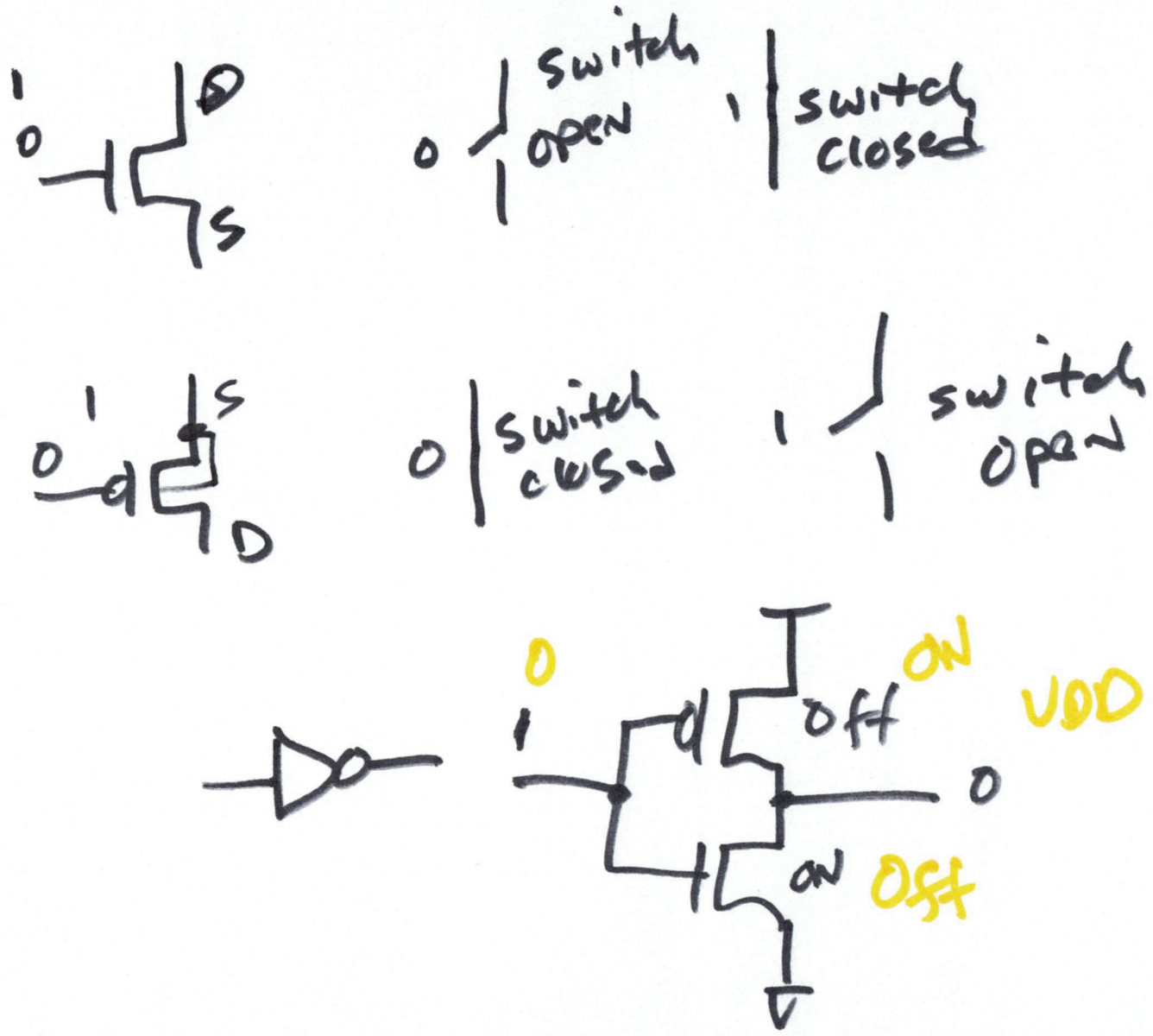
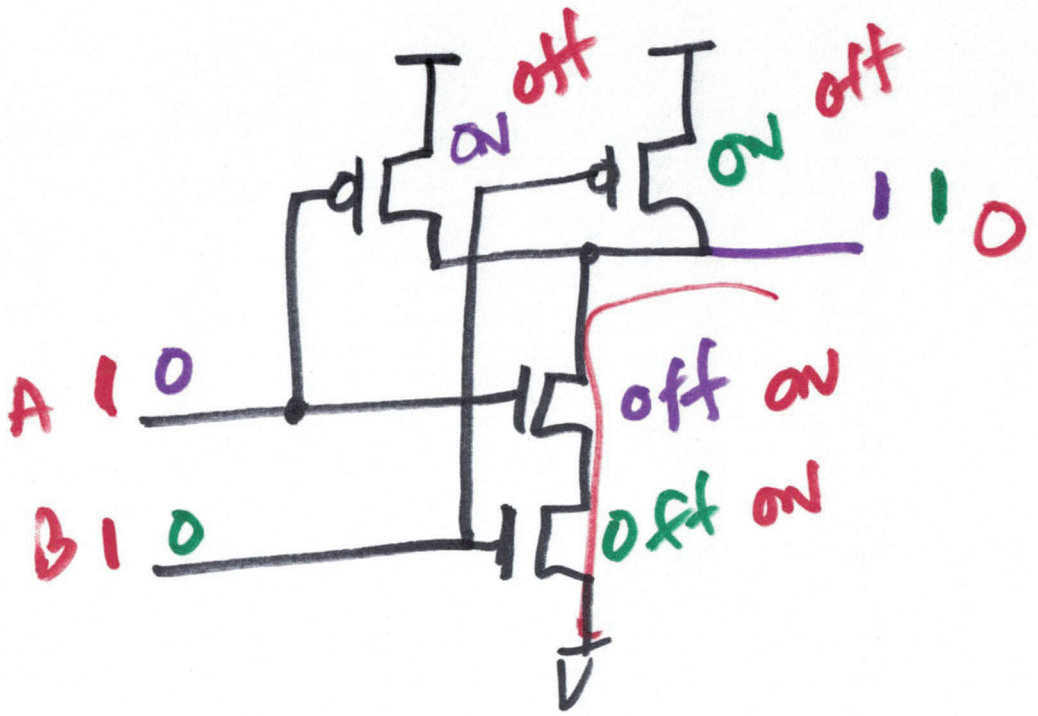
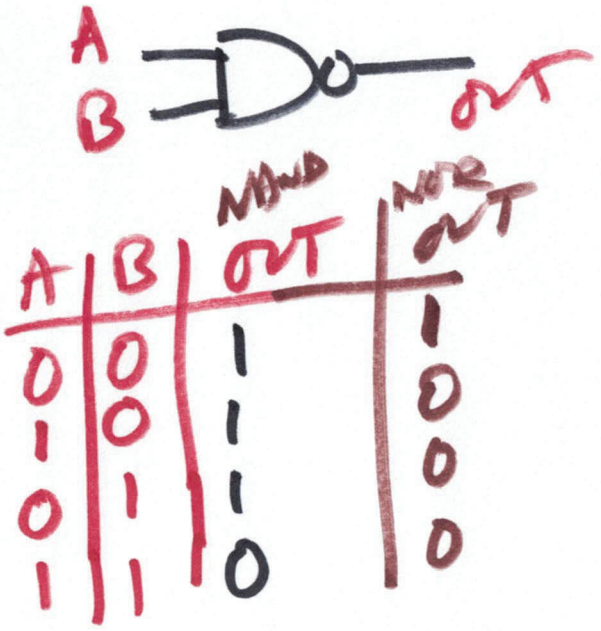
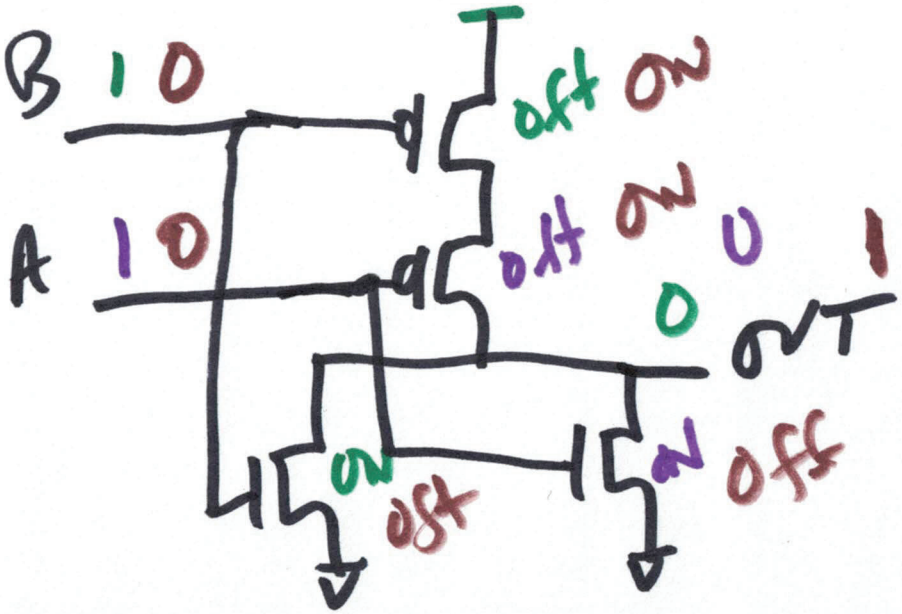
EE442 / ECG 642
Power Electronics
Lecture 16
Oct. 26, 2022



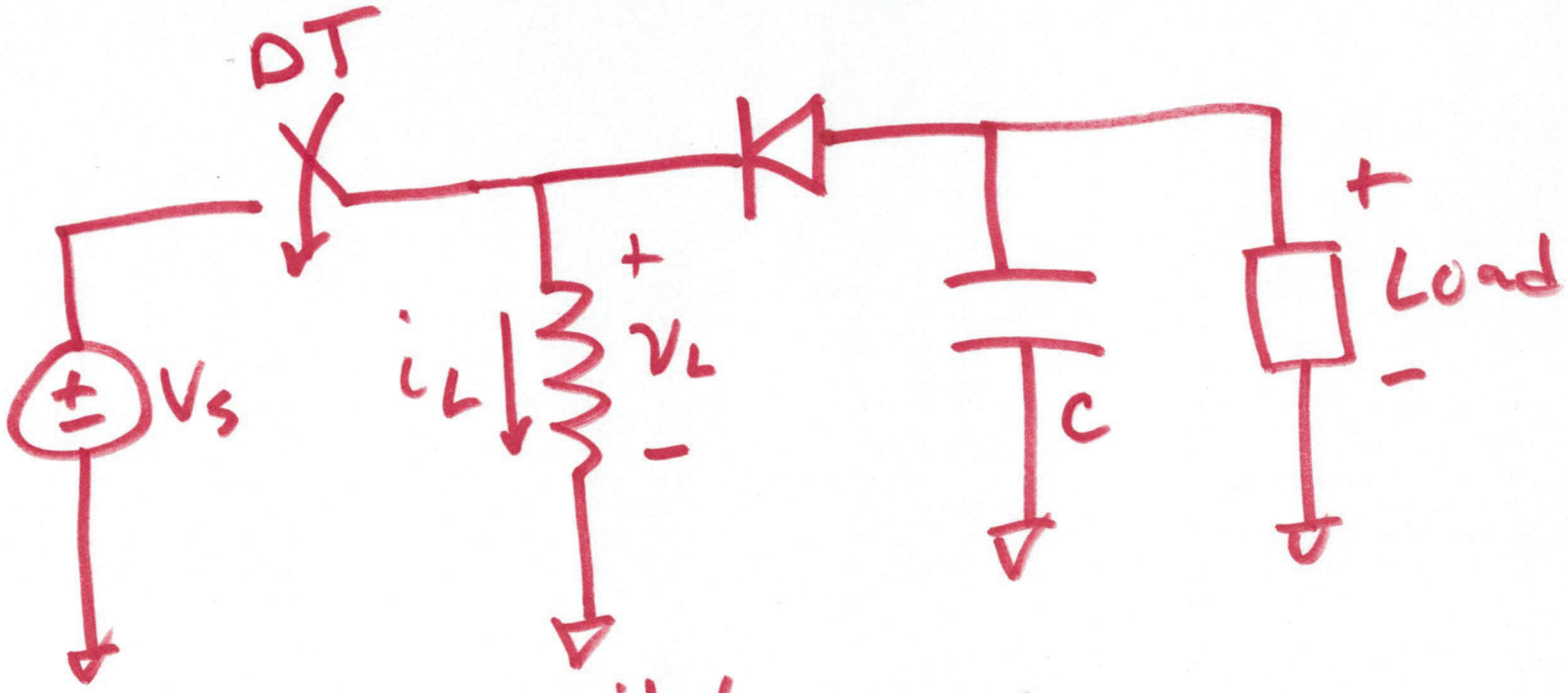

1
0
D
S
0
switch
open
1
switch
closed
1
0
S
D
0
switch
closed
1
switch
open
0
1
off
ON
VDD
0
ON
Off


A
B
1
0
ON
off
OUT


A
B
OUT
NAND
NOR
A B OUT OUT
0 0 1 1
0 1 1 0
1 0 1 0
1 1 0 0


B
A
1
0
ON
off
OUT

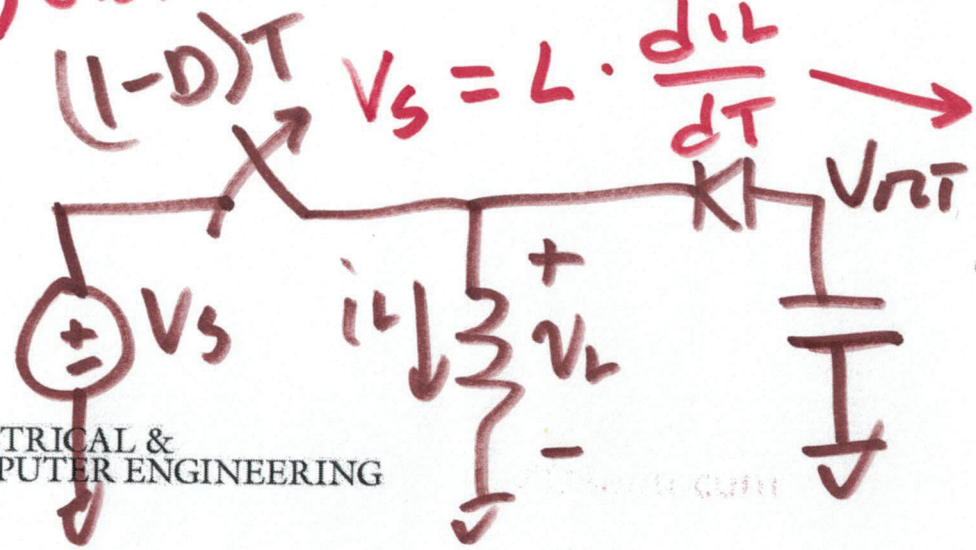
Buck – Boost



1) Close the switch

$$V_s = L \cdot \frac{di_L}{dT} \rightarrow \Delta i_{LU} = \frac{V_s}{L} \cdot DT$$

$$\Delta \frac{V_s}{L} =$$



$$V_{RT} = L \frac{\Delta i_{LD}}{(1-D)T}$$

$$V_{OUT} = L \cdot \frac{\Delta i_{LD}}{(1-D)T}$$

$$\Delta i_{LD} = \frac{V_{OUT}}{L} \cdot (1-D)\,T$$

$$\frac{V_S}{L} \cdot DT = -\frac{V_{OUT}}{L} \cdot (1-D)T$$

$$5 = L \cdot \frac{1A}{5\mu}$$

$$\frac{25\mu}{1A} = L$$

$25\mu H$

$$V_{OUT} = -V_S \cdot \frac{D}{1-D}$$

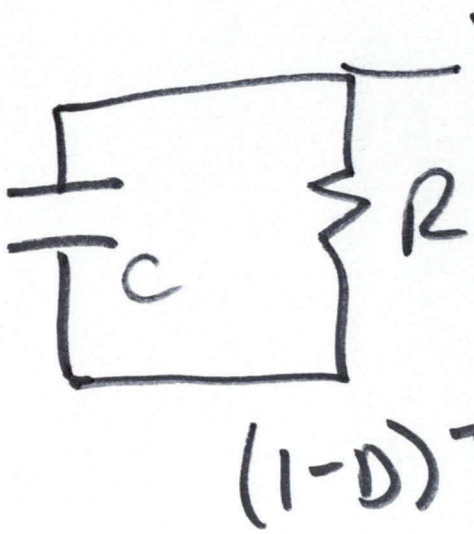
$$5 = 125$$

$$3 = \frac{D}{1-D}$$

$$3-3D = D$$

$$3 = 4D$$

$$D = \frac{3}{4}$$



$$\frac{V_{out}}{R} = I = C\frac{dV}{dT} = C\frac{\Delta V_{out}}{(1-D)\cdot T}$$

$$\Delta V_{out} = \frac{I\cdot(1-D)\cdot T}{C}$$

$$= \frac{1.5\,(1-.75)\cdot 10\mu}{25\mu}$$

$$\Delta V_{out} \cdot .15 = \frac{1.5\cdot 2.5\cancel{\mu}}{10\ 25\cancel{\mu}}$$