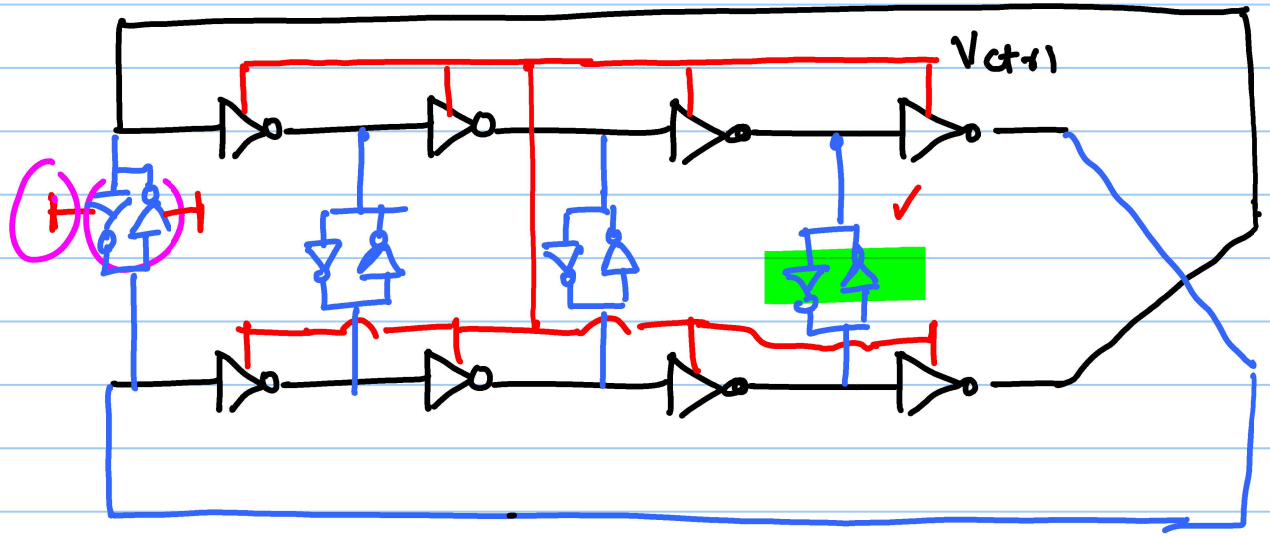
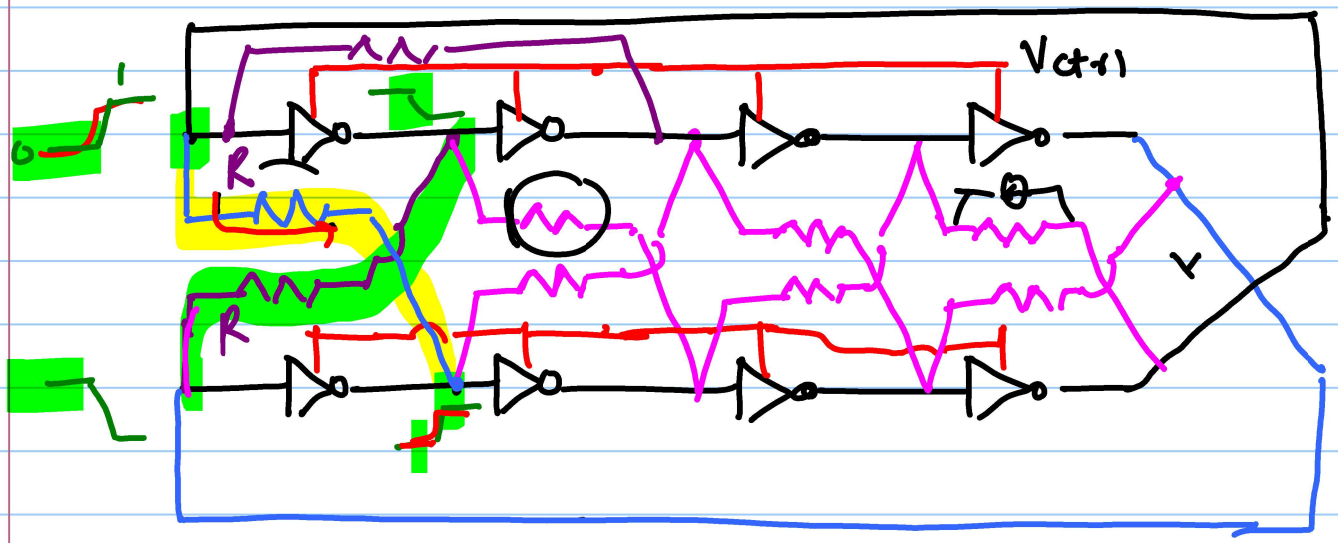
Lecture # 24

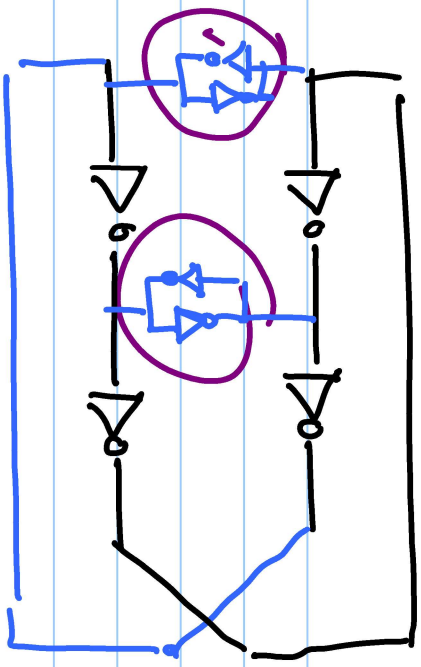
Note Title 17-07-2020

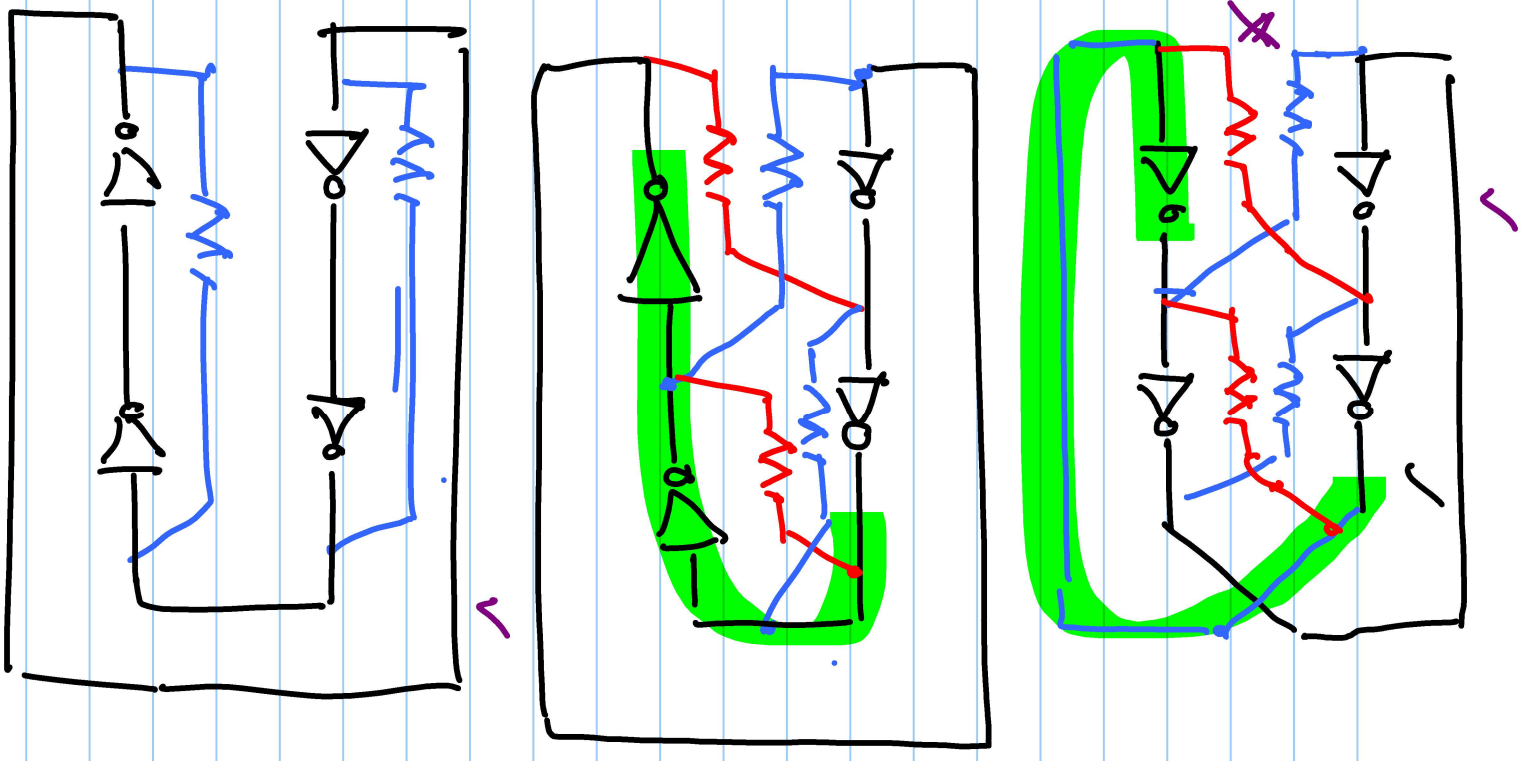


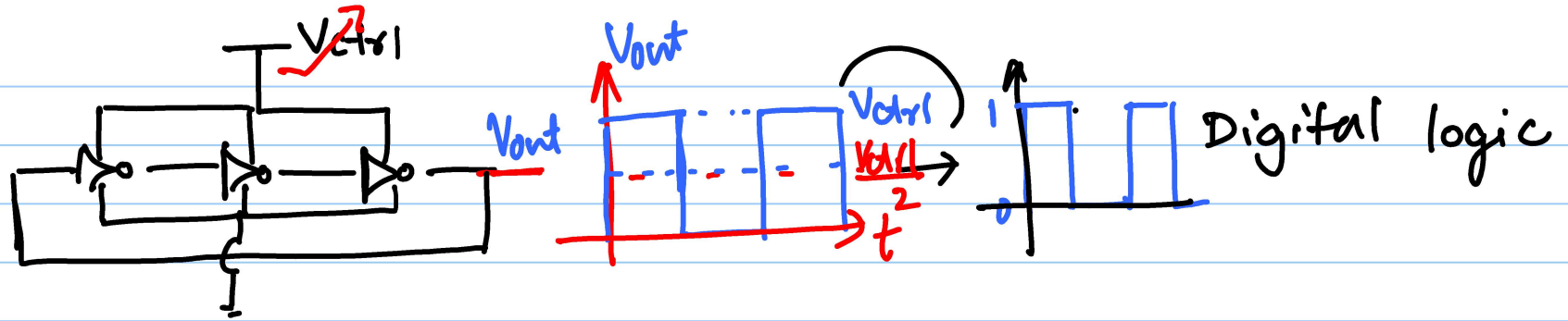
→ Power consumption in cross-coupled inv.

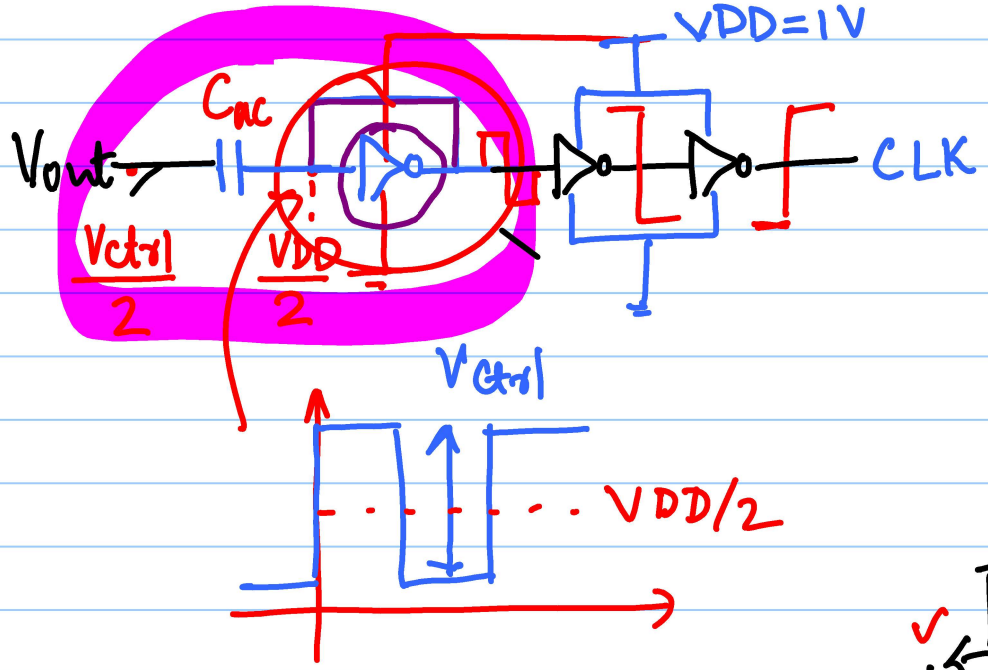


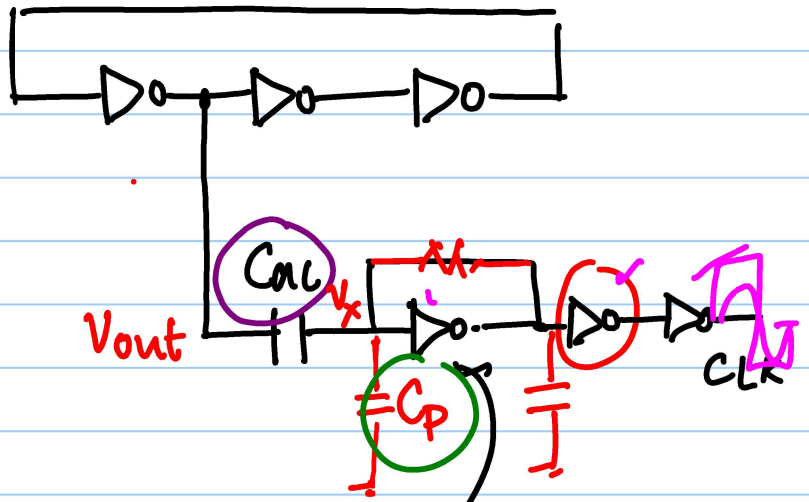
- R is small
- R is large.
- R: poly resistor. ±20%

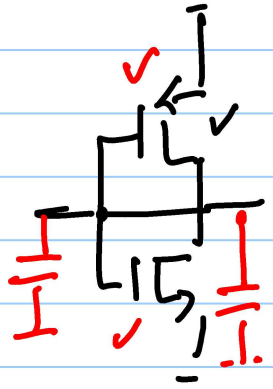


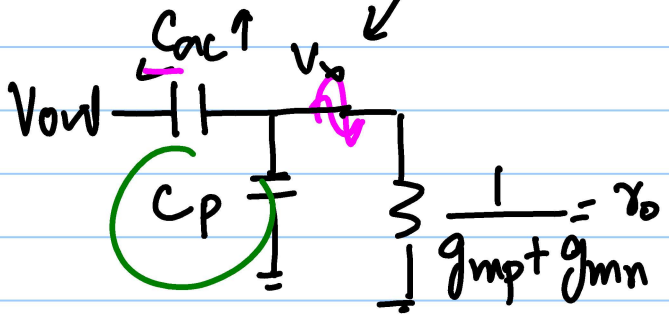












$$\frac{V_x}{V_{out}} = \frac{r_o \| \frac{1}{sC_p}}{r_o \| \frac{1}{sC_p} + \frac{1}{sC_{ac}}}$$

$$\frac{V_x}{V_{out}} \approx 1$$

$$= \frac{r_o \,/\!/\, \frac{1+sC_p r_o}{}}{\frac{r_o}{1+sC_p r_o} + \frac{1}{sC_{ac}}} = \frac{s r_o C_{ac}}{s C_{ac} r_o + s C_p r_o + 1}$$

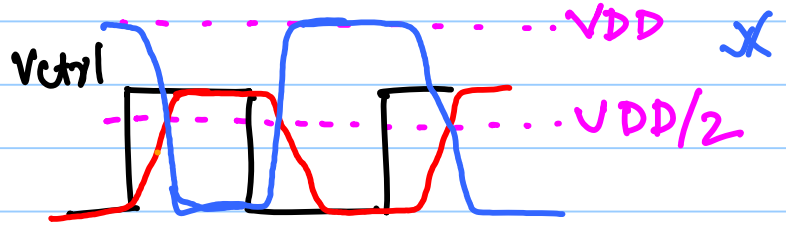
$$= \frac{s r_o C_{ac}}{1 + s(C_{ac} + C_p) r_o}$$

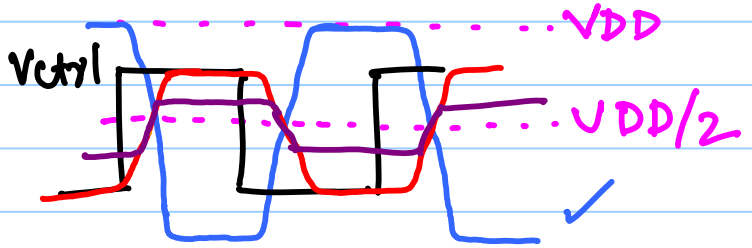
$$\approx \frac{C_{ac}}{C_{ac} + C_p} \checkmark$$

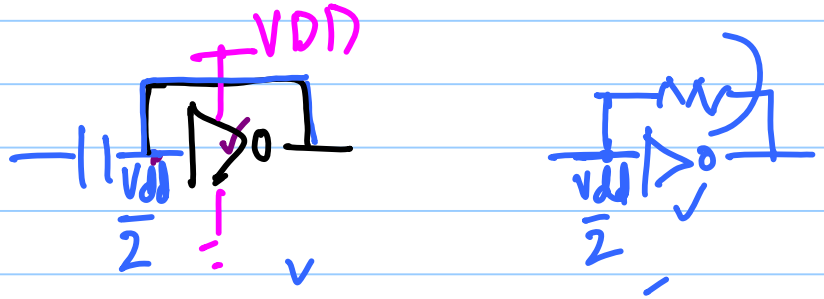
$C_{ac} \gg C_p$.

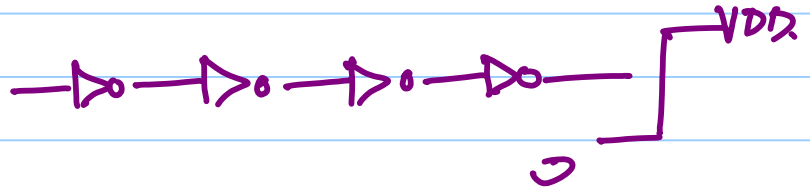
10% Vctrl → ▷o−▷o

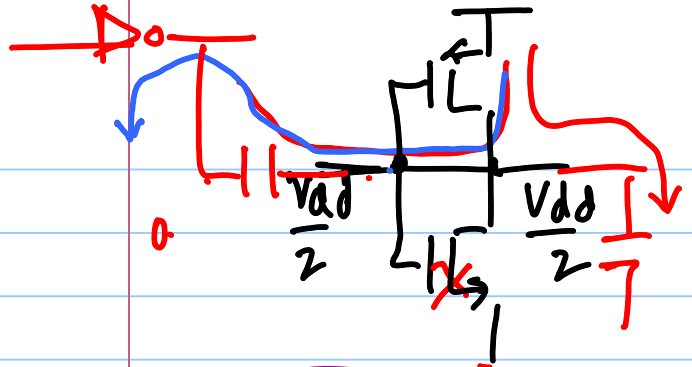
90% → ▷o−▷o



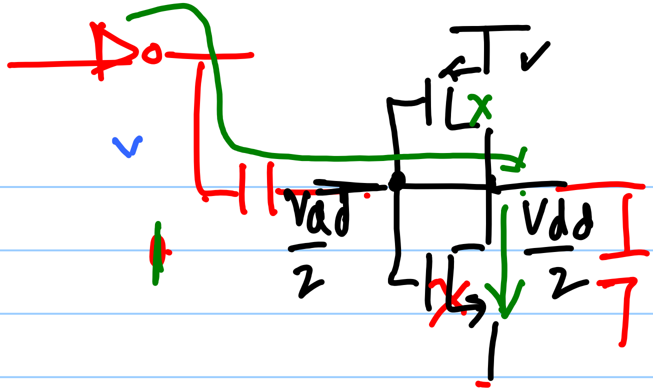




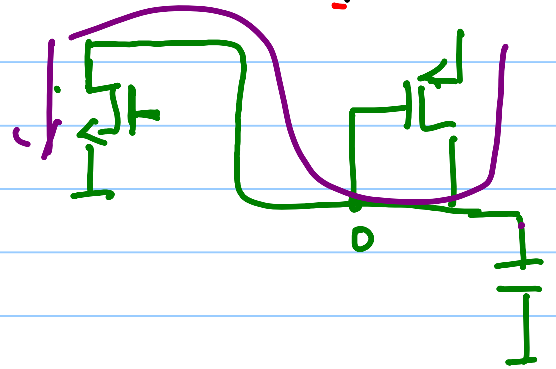




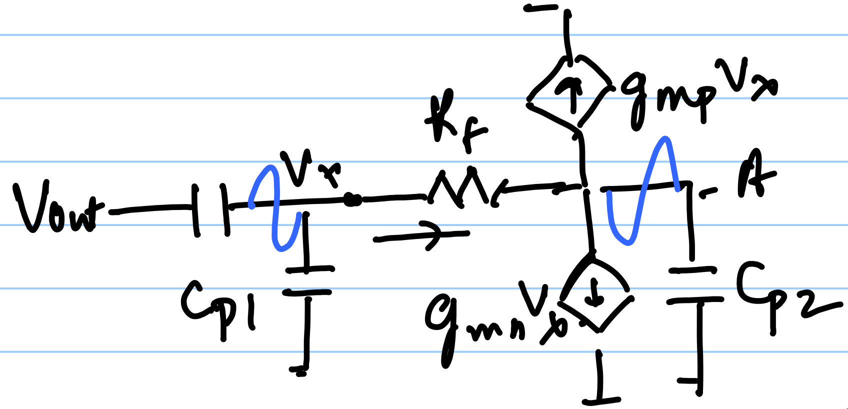
Vdd
2
Vdd
2
0



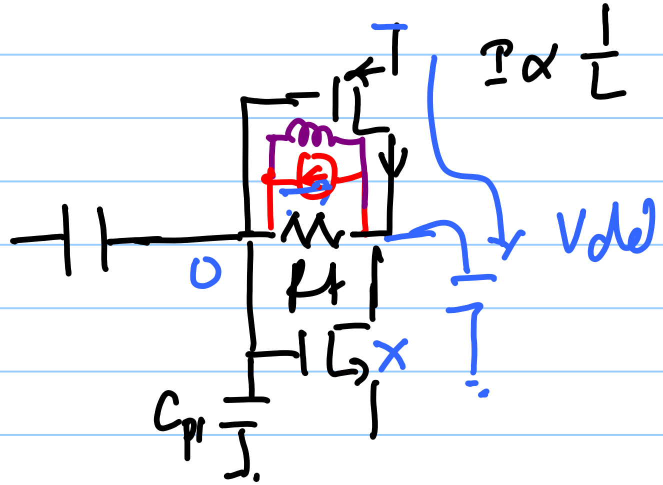
Vdd
2
Vdd
2



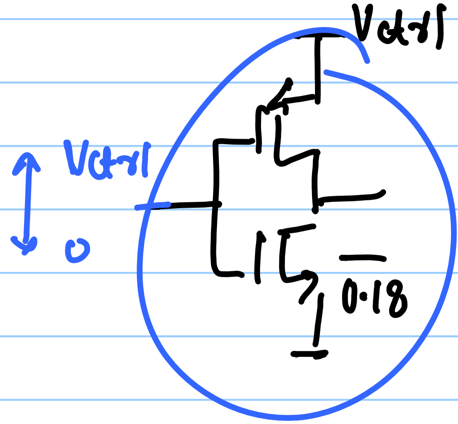
0



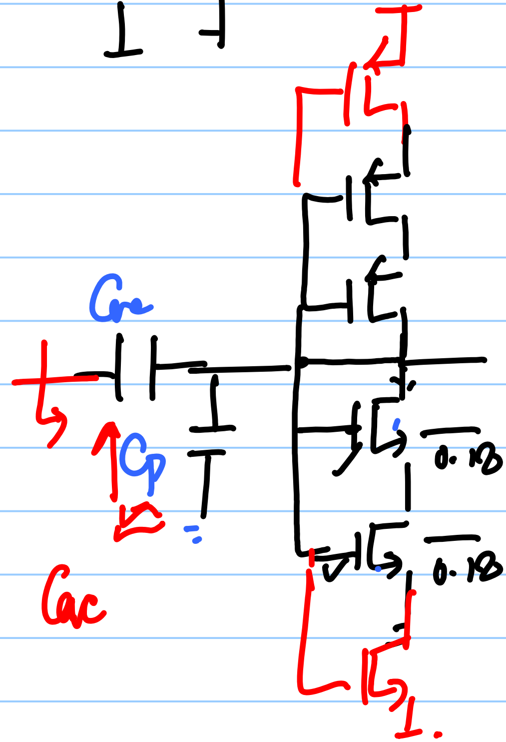
Vout
Vx
Rf
A
gmpVx
gmnVx
Cp1
Cp2



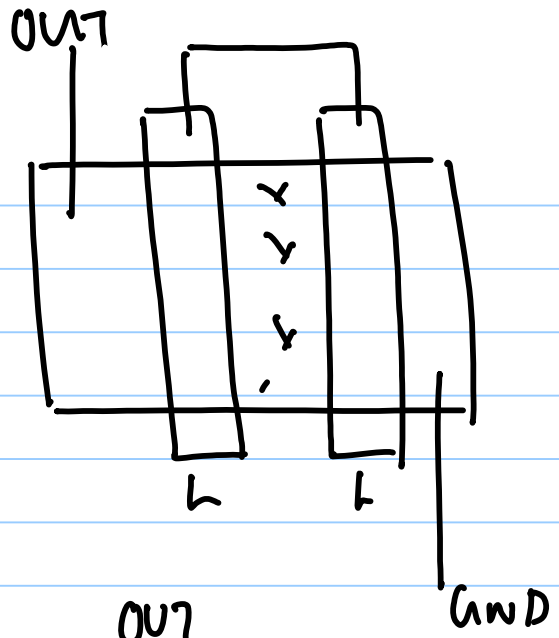
I ∝ 1/L
Vdd
0
Cp1

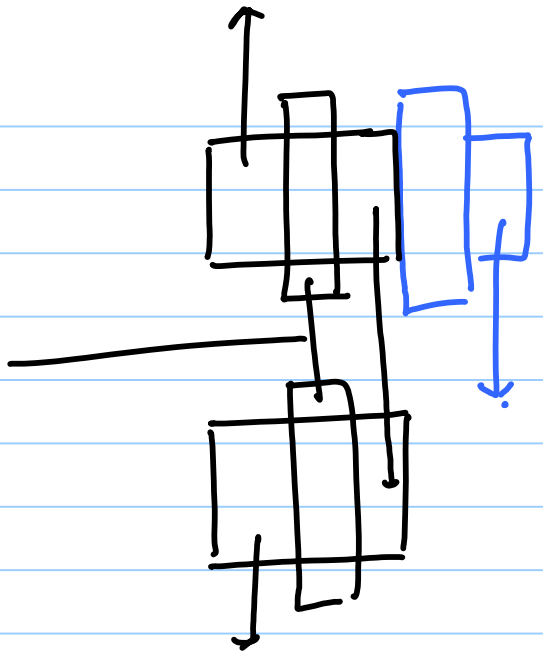


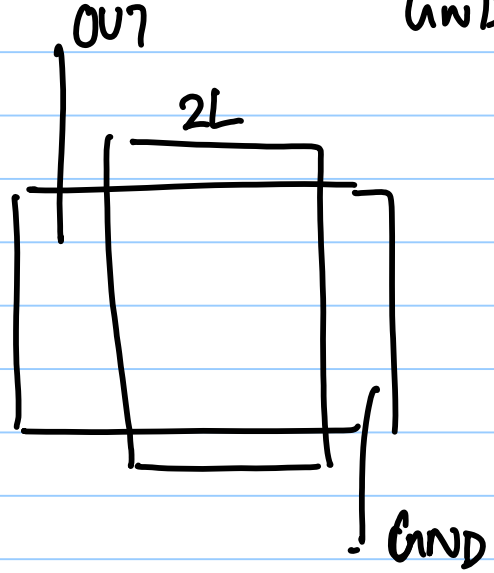
Vctrl
Vctrl
0
0.18

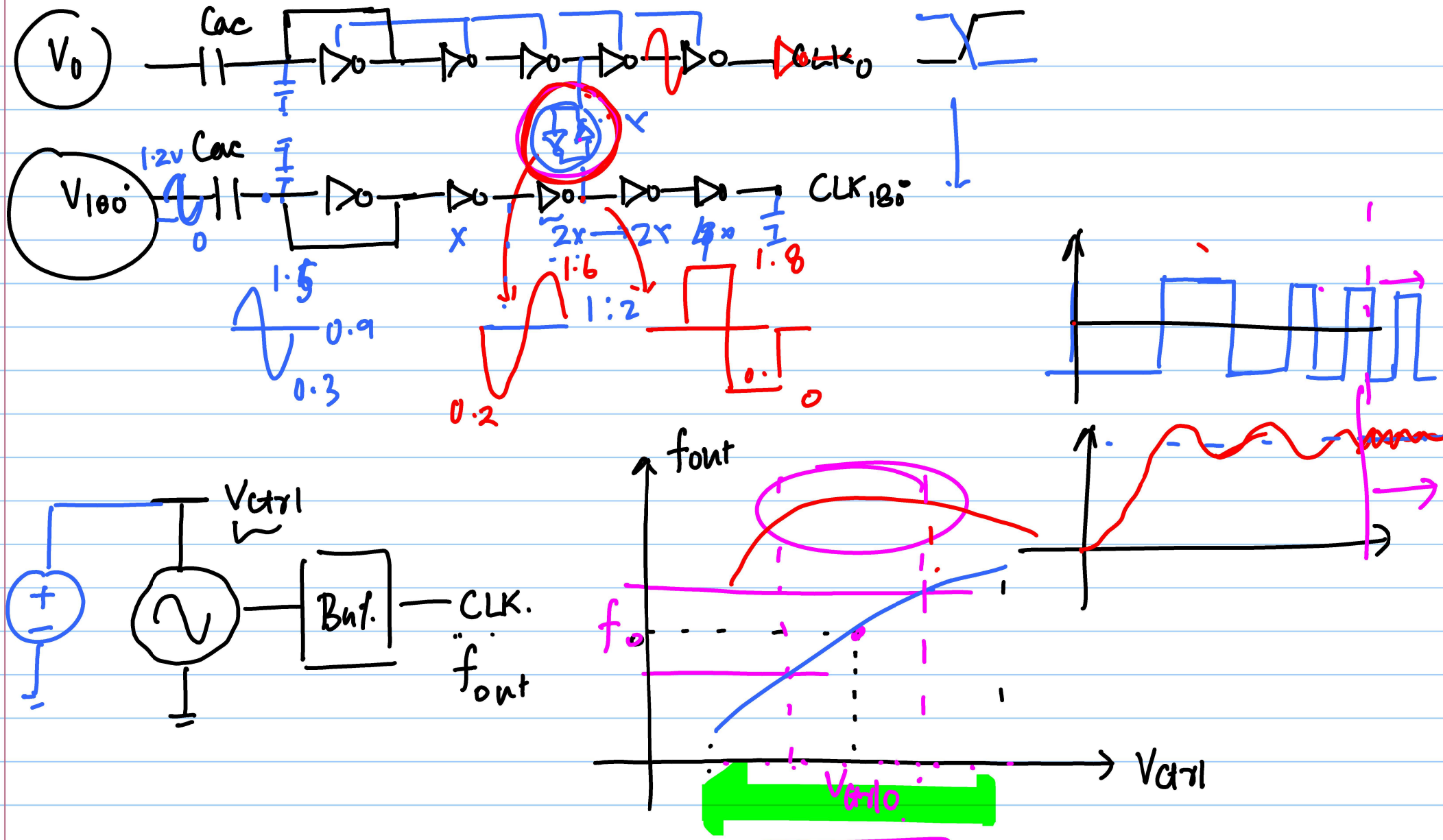


Cac
Cp
Cac
0.18
0.18


OUT
L
L
GND




OUT
2L
GND



— transient simu.

— freq. / frequency.

$$K_{VCO} = \frac{df_{out}}{dV_{ctrl}}$$