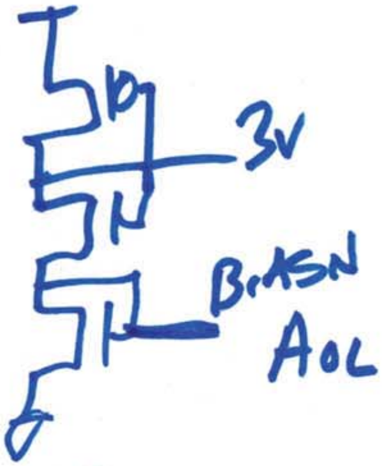
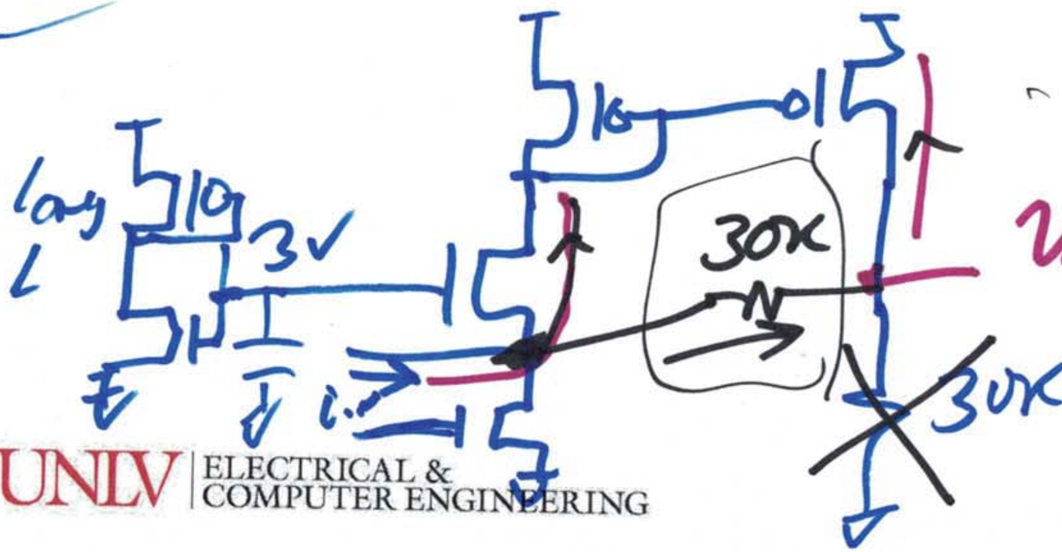
EEG 720
Advanced Analog IC Design

Lecture 18
March 29, 2016



AOL for the example we did last time.

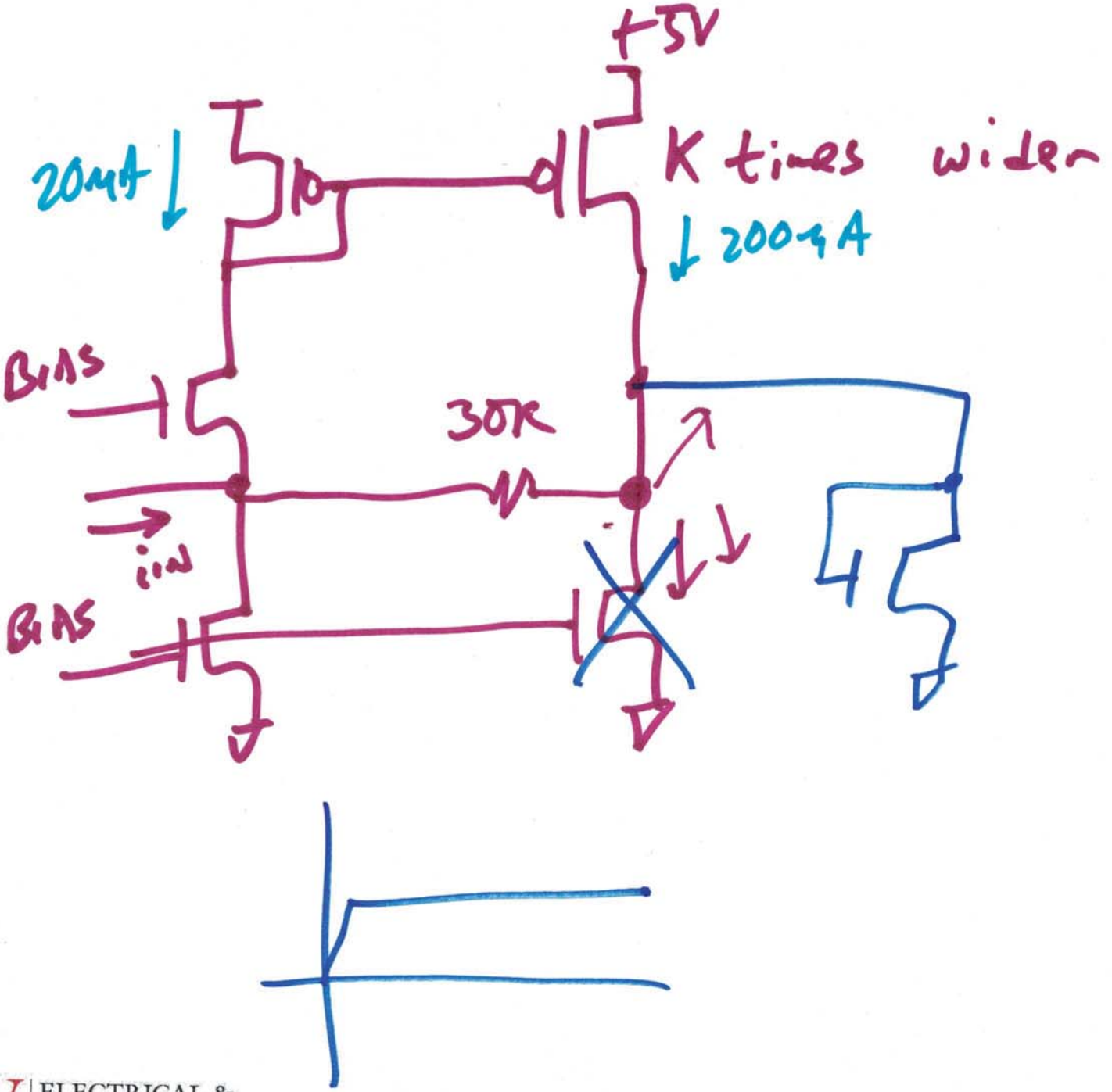


$\beta = \frac{1}{30K}$, $A_{CL}\big|_{ideal} = \frac{1}{\beta}$

$v_{out} = -i_{in} \cdot 30K$

$$A_{CL}\Big|_{actual} = \frac{A_{OL}\, 30K}{1 + \beta \cdot A_{OL}}$$

($\beta \to \frac{1}{30K}$, $A_{OL} \to 30K$) $\Rightarrow$ 15K



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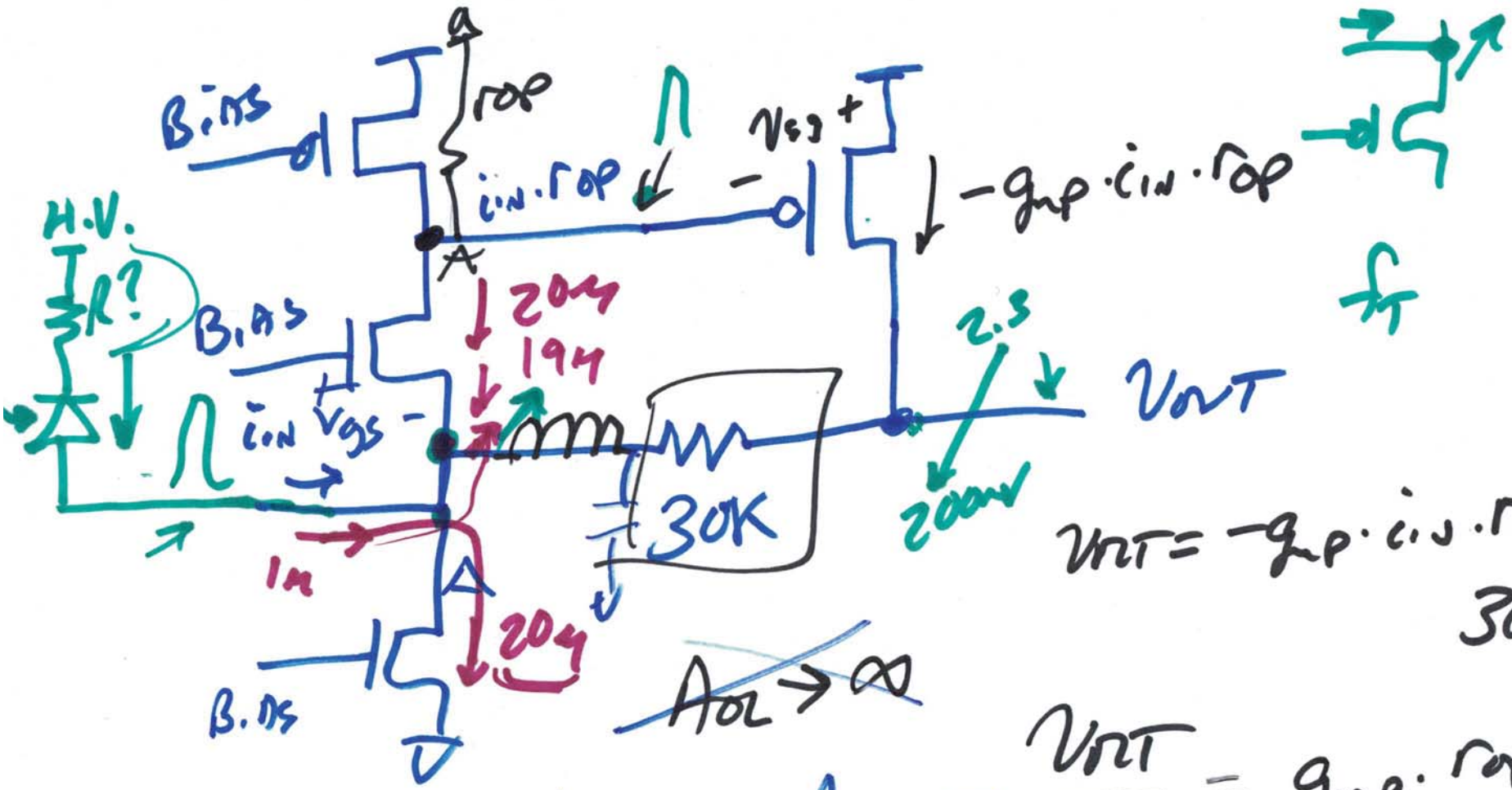
2)



$$V_{OUT} = -g_{mp} \cdot i_{in} \cdot r_{op} \cdot 30K$$

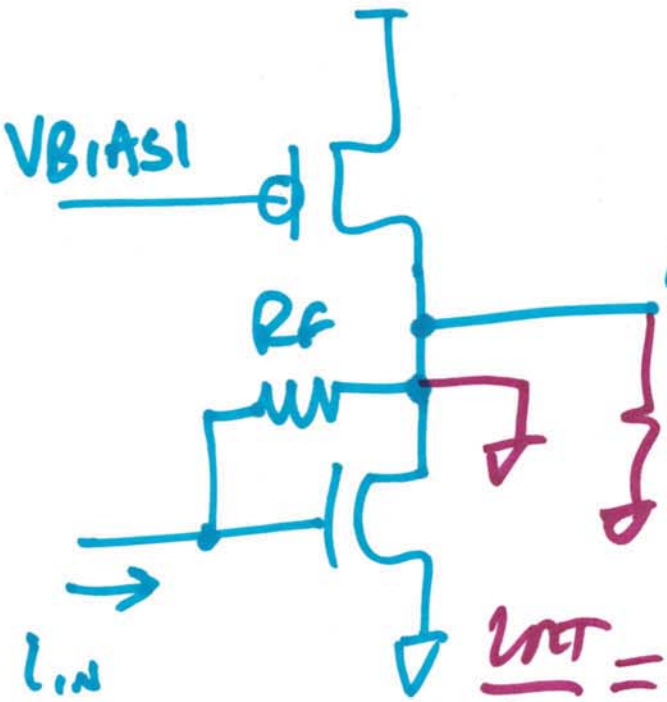
~~$A_{OL} \to \infty$~~

$$A_{OL} = \frac{V_{OUT}}{i_{in}} = g_{mp} \cdot r_{op} \cdot 30K$$

$$A_{CL} = \frac{\cancel{g_{mp} \cdot r_{op} \cdot 30K}}{1 + \frac{1}{30K} \cdot \cancel{g_{mp} \cdot r_{op} \cdot 30K}} = 30K$$

3)

Another shunt-shunt f.b. Amp



$A_{OL} \Rightarrow$

$v_{gs} = i_{IN} \cdot R_F$

$v_{OUT} = -R_F \| r_{op} \| r_{ON} \simeq R_F$

$= g_m v_{gs} \cdot R_F$

$\frac{v_{OUT}}{i_{in}} = A_{OL} = -g_m R_F \cdot (R_F)$

$= -g_m R_F^2$

$R_i = R_F$

$R_o = R_F \| r_{op} \| r_{ON}$ $\quad \beta = \frac{-1}{R_F}$