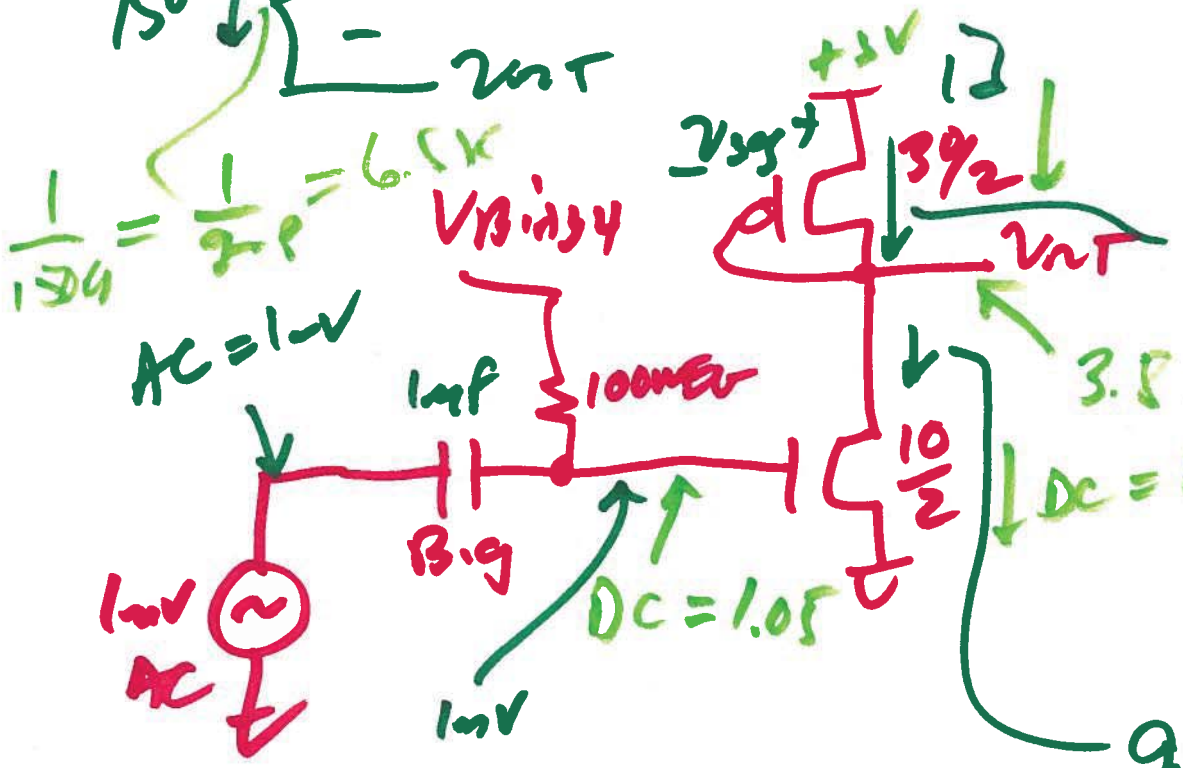
EE 420/ECG 620

Lecture 12

MARCH 1, 2017

Analog IC Design

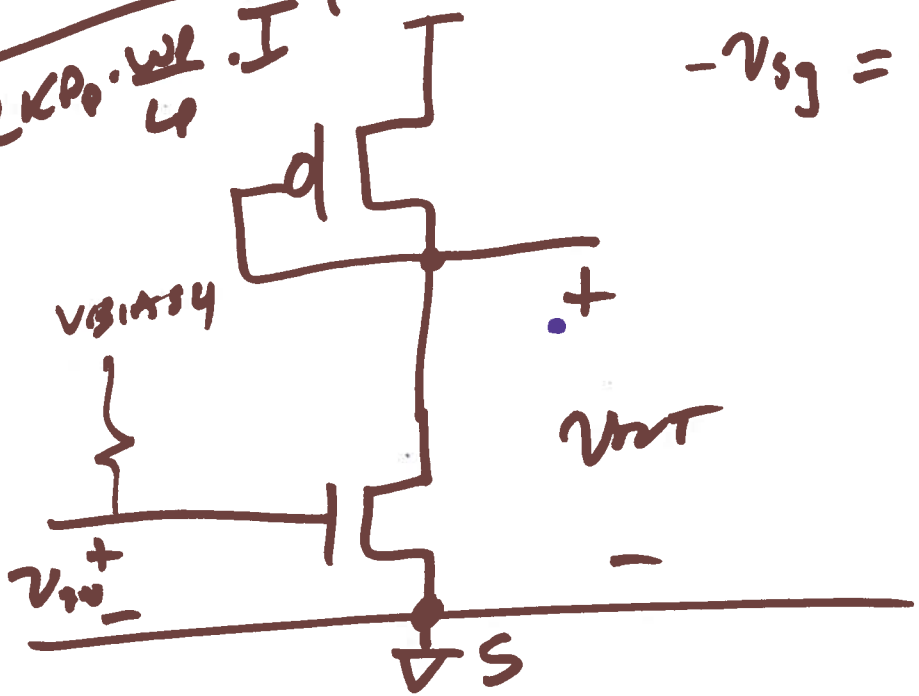


$v_{out} = -6.5k \cdot 150mA = -975mV \approx -1V$

$20\log 10^{-3} = -60 \log 10 = -60\,dB$

$10^{-3}V = 0.001V = 1mV$

Common - source



$$g_{mp} = \sqrt{2K_p' \cdot \frac{W}{L_p} \cdot I}$$

$$-v_{sg} = v_{in} - v_{sg}$$

$$v_{out} = v_{gs}$$

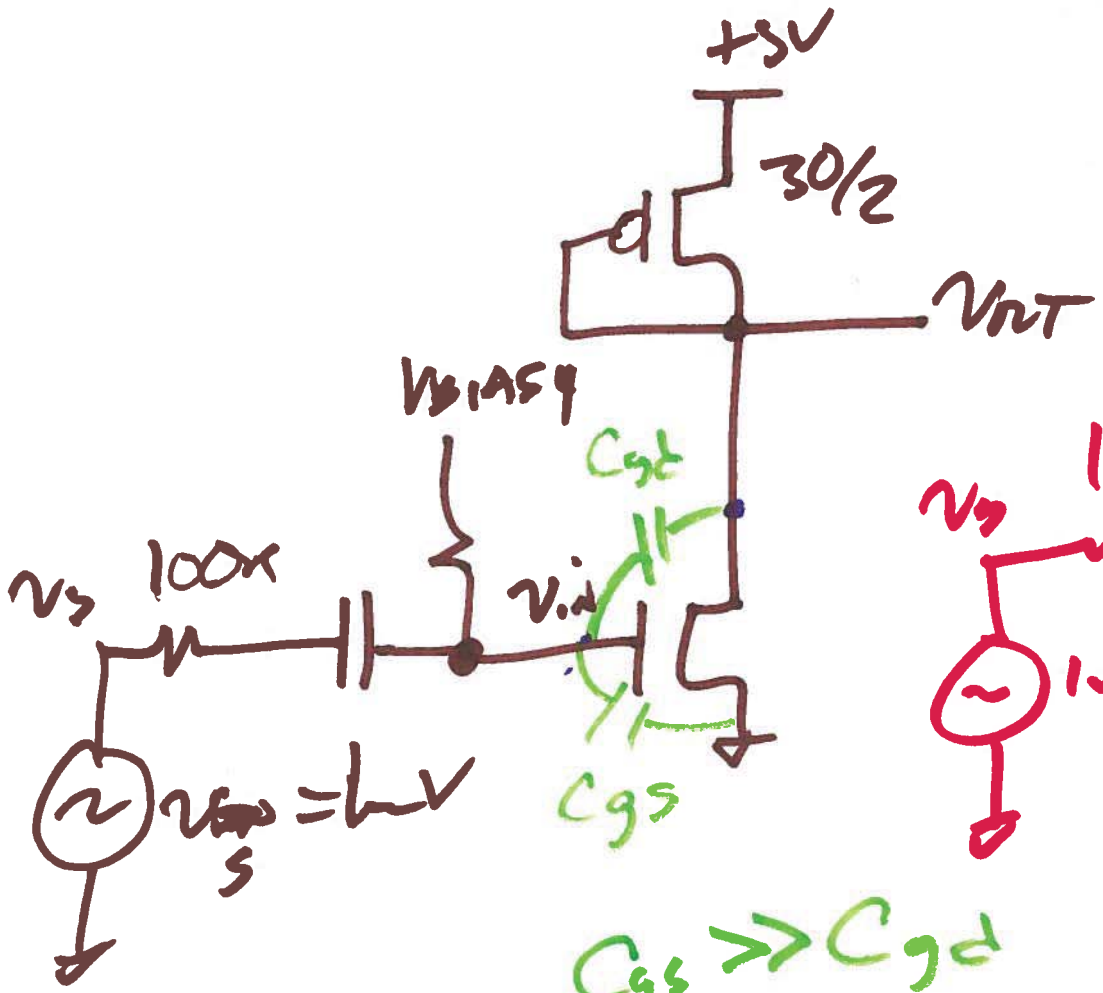
$$i_d = g_{mp}(-v_{in})$$

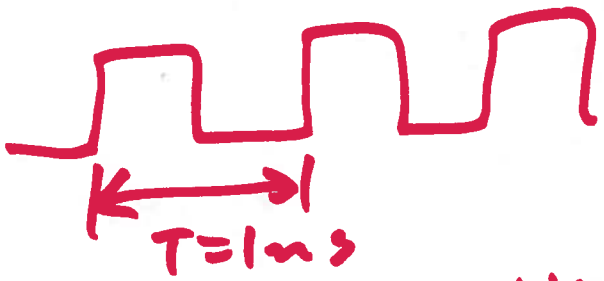
$$\frac{i_d}{g_{mN}} = v_{gs}$$

$$v_{out} = \frac{g_{mp}(-v_{in})}{g_{mN}}$$

$$\frac{v_{out}}{v_{in}} = \frac{-g_{mp}}{g_{mN}}$$

$$\frac{v_{out}}{v_{in}} = \frac{-g_{mN}}{g_{mp}} \approx -1\,\frac{V}{V}$$





$\frac{1}{1ms} = 1KHz$

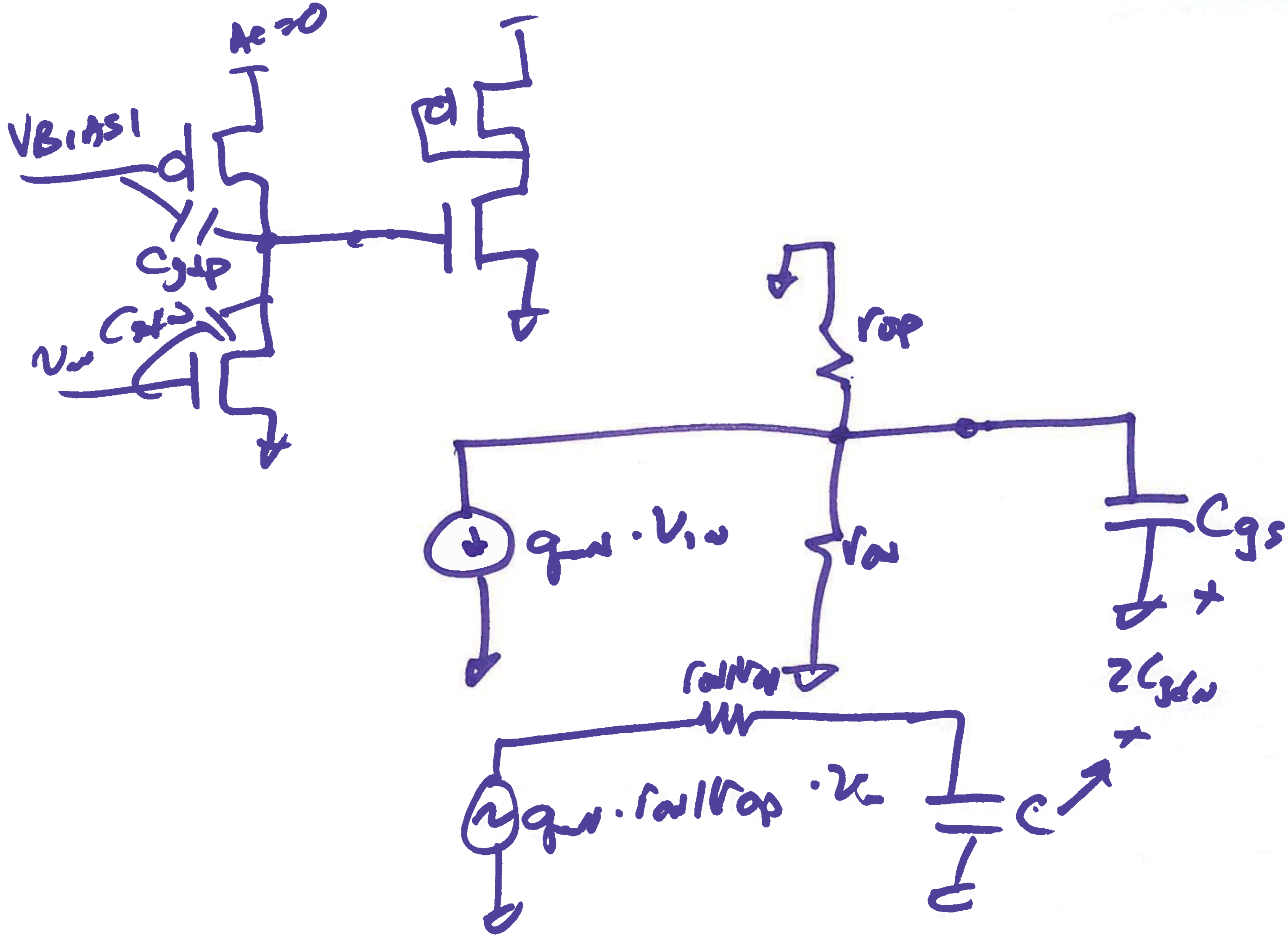
$C_{gs} \gg C_{gd}$

$$f_{3dB} = \frac{1}{2\pi \cdot 10^5 \cdot 23.3 \cdot 10^{-15}}$$

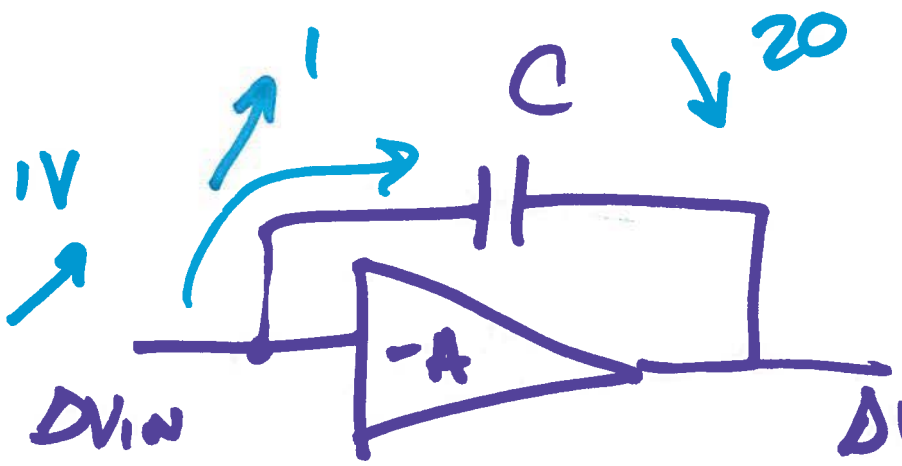
$$= \frac{0.159}{23.3 \cdot 10^{-10}}$$

$$63.8MHz = \frac{1.59}{23.3} \cdot 10^{-9}$$

$(C_{gs} + 2C_{gd})$


AC=0
VBIAS1
Cgdp
Vin
rop
gmn · Vin
ron
Cgs
2Cgdn
ron||rop
gmn · ron||rop · Vin
C

4)



$\Delta V_{OUT} = -A \cdot \Delta V_{IN}$

$-A \cdot 1$

$A = 20$

$-20V$

ΔV_{IN}

$C(1+|A|)$

ΔV_{OUT}

$C\left(1+\frac{1}{|A|}\right)$