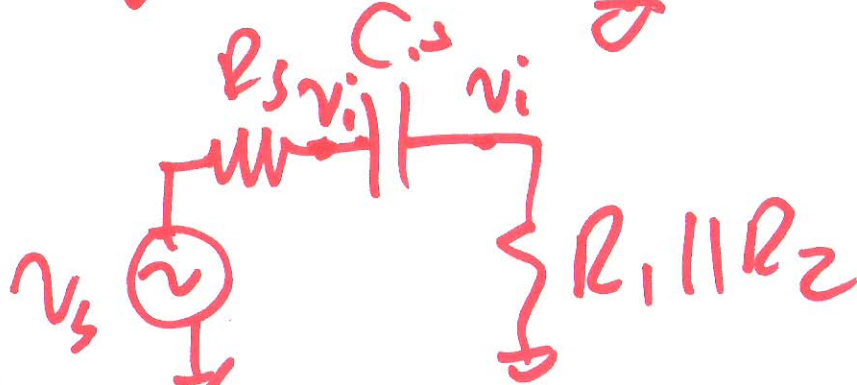
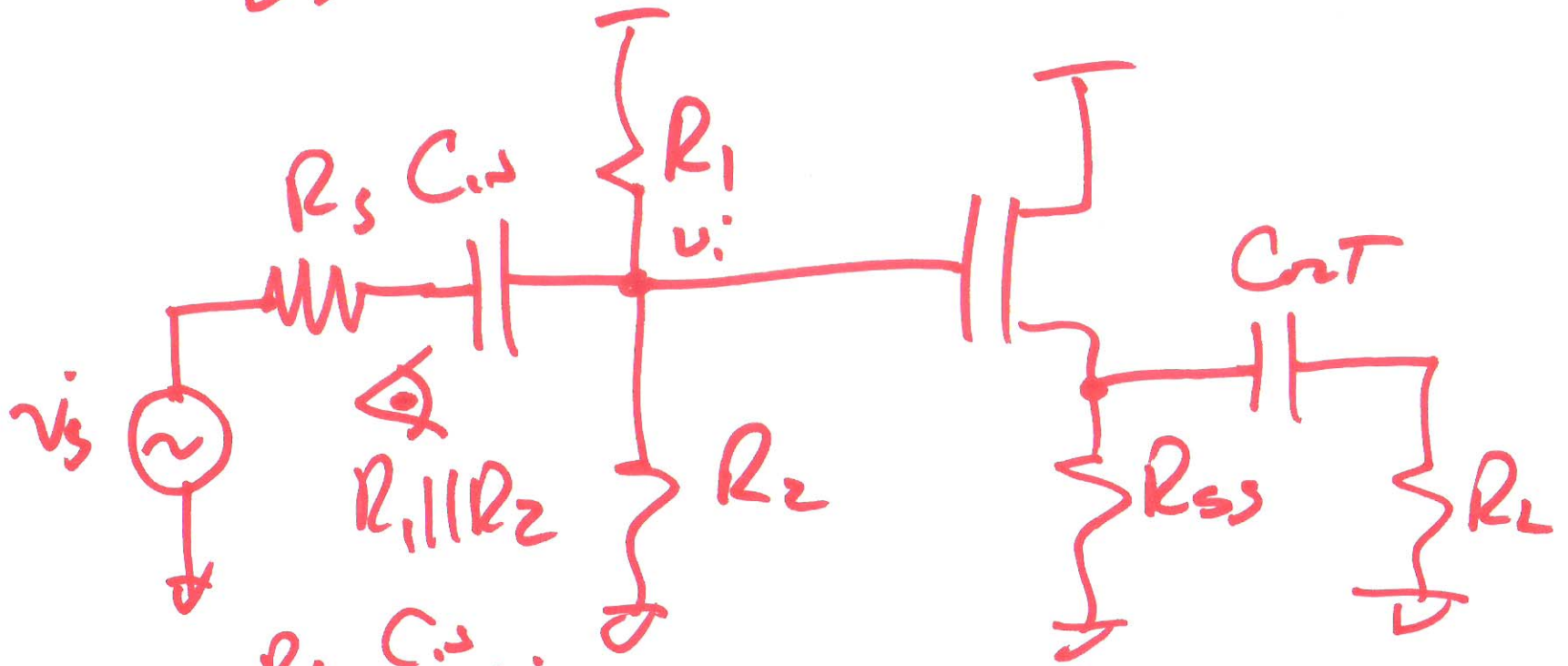


Lecture 21

4/18/14

EE 320



$$f_{3dB} = \frac{1}{2\pi C_{in} (R_s + R_1 || R_2)}$$

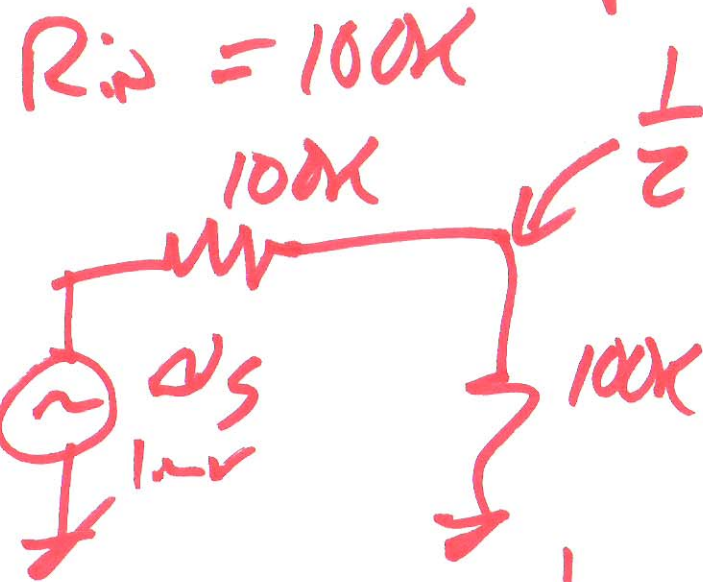
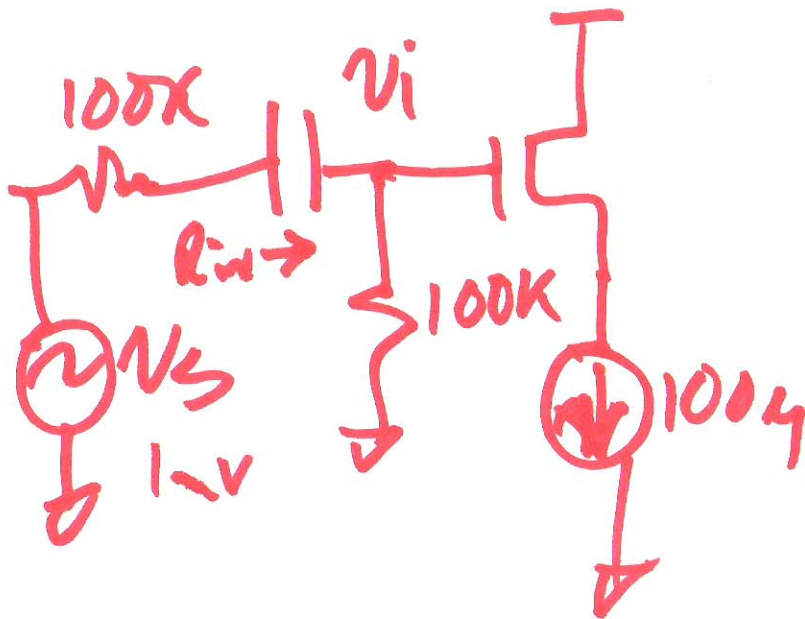
$$10 = \frac{1}{2\pi \cdot C \cdot (100K + 50K)}$$

$$C = 0.14F$$

$$f_c = \sqrt{2 \cdot K_{p-w} \cdot I_D}$$

$$= \sqrt{2 \cdot 120 \mu \cdot 100 \cdot 100 \mu}$$

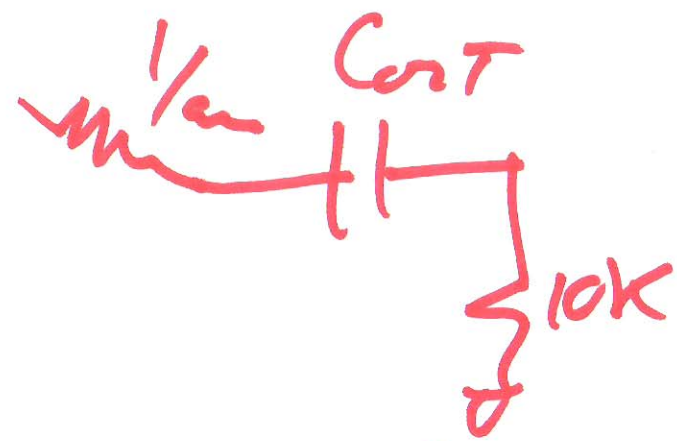
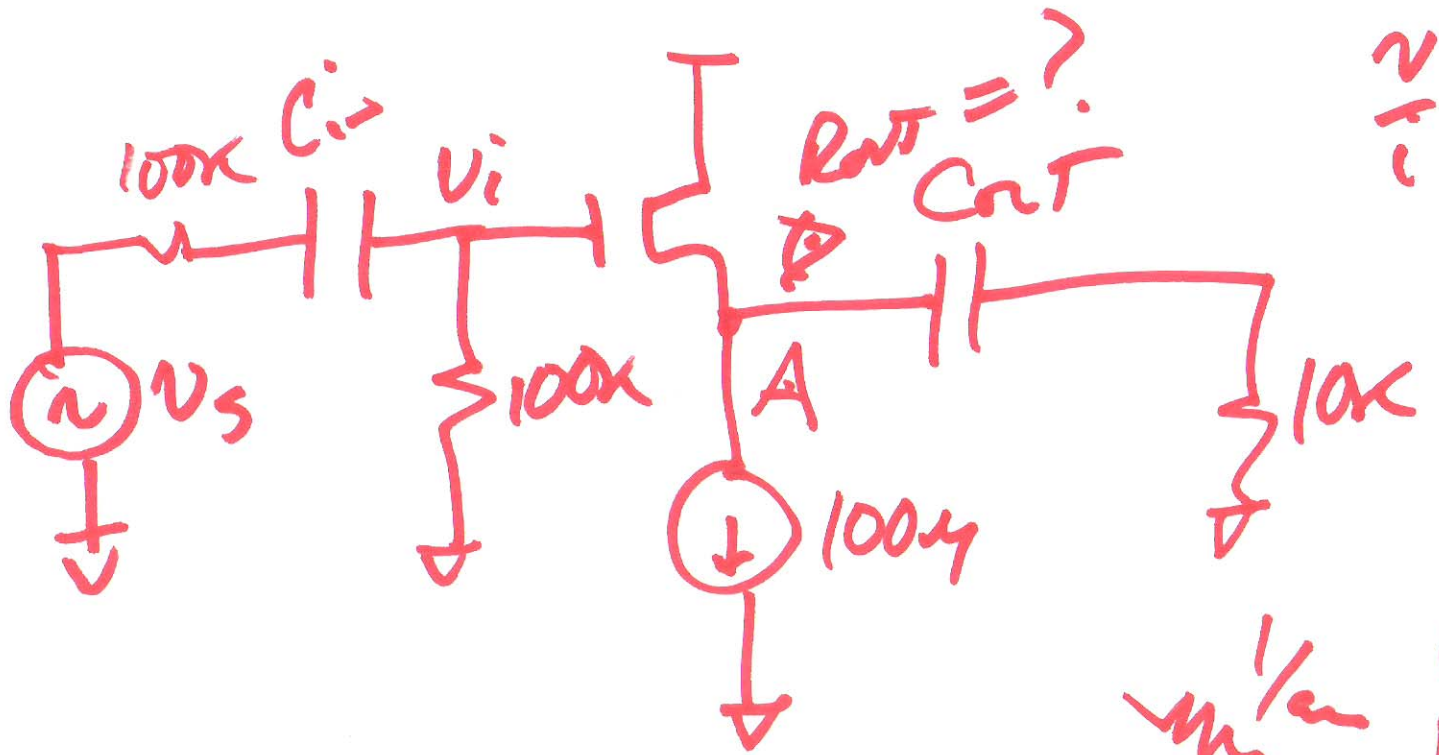
$f_c = 1.55 \frac{MHz}{V}$



$$f_{3dB} = 10 = \frac{1}{2\pi \cdot C \cdot (200K)}$$

$$C = 80nF$$

2)

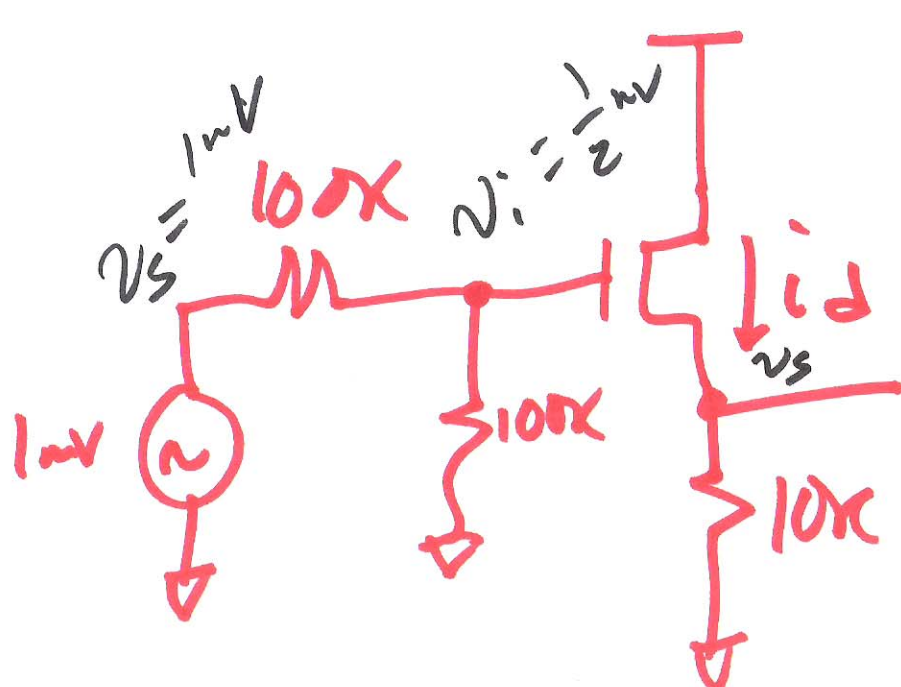


$$f_{3dB} = \frac{1}{2\pi C_{out} (10k + \frac{1}{s})}$$

$$10 = \frac{1}{2\pi \cdot C_{out} (\frac{1}{1.5s} + 10k)}$$

$$C_{out} = 1.54F$$

3)



$$i_d = \frac{v_i}{\frac{1}{g_m} + 10k}$$

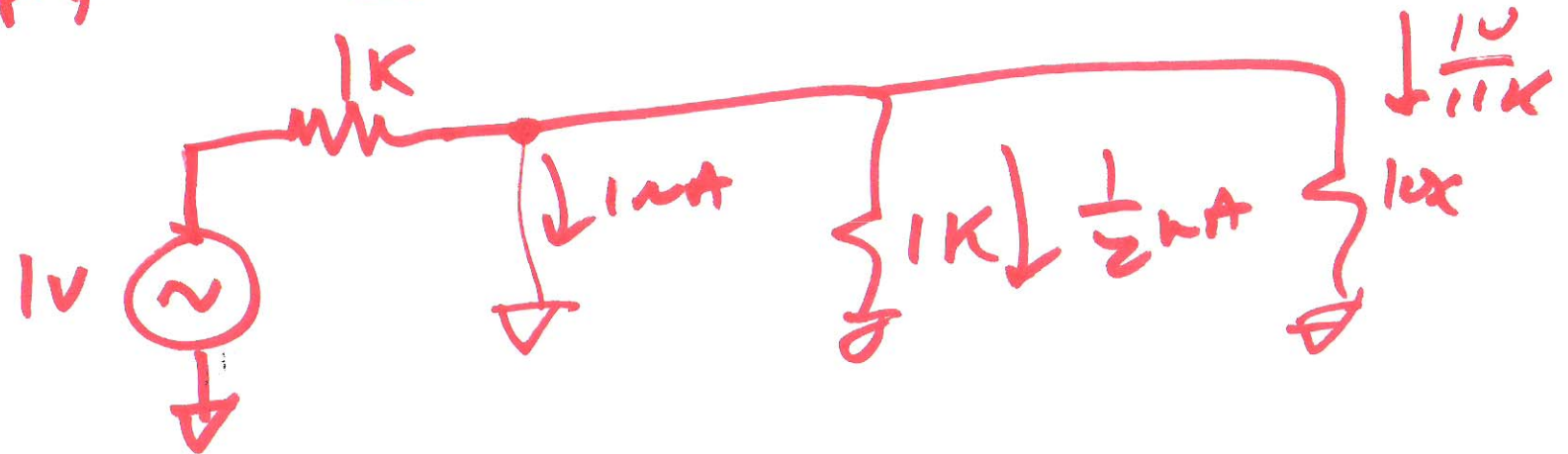
$$V_{NT} = i_d \cdot 10k$$

$$v_i = v_{gs} + v_{NT}$$

$$v_i = i_d \left(\frac{1}{g_m} + 10k \right)$$

supply 1V @ 1mA (max)

$$v_{gs} =$$



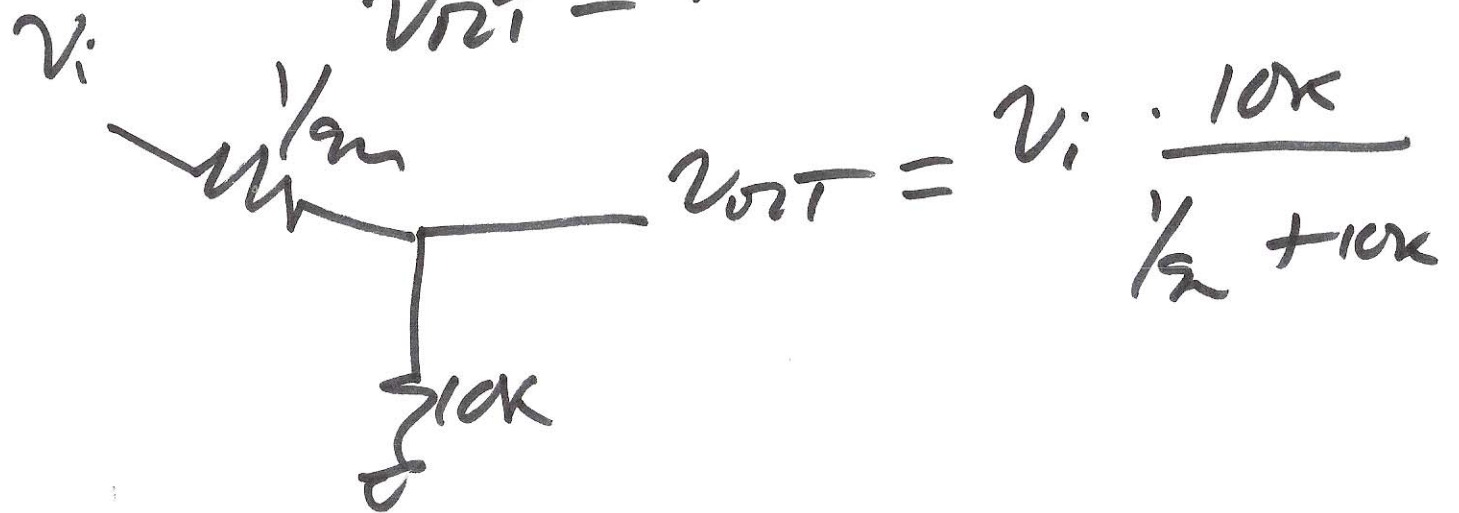
4)

$$V_{out} = i_d \cdot 10k$$

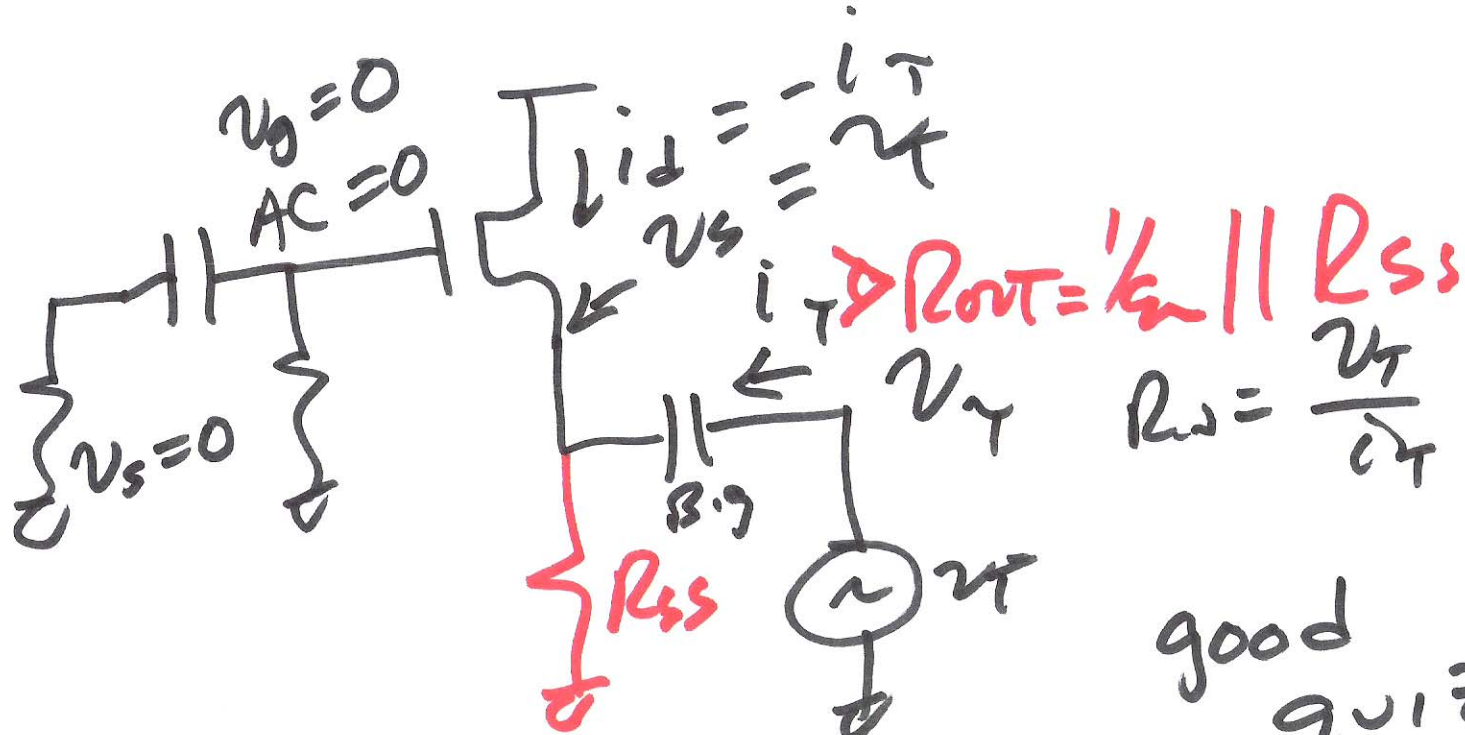
$$\frac{V_{out}}{V_{in}} = \frac{10k}{\frac{1}{g_m} + 10k} = \frac{10k}{10.6k} = .94$$

$$V_{in} = \frac{1}{2} \mu V$$

$$V_{out} = .47 \mu V$$



5)



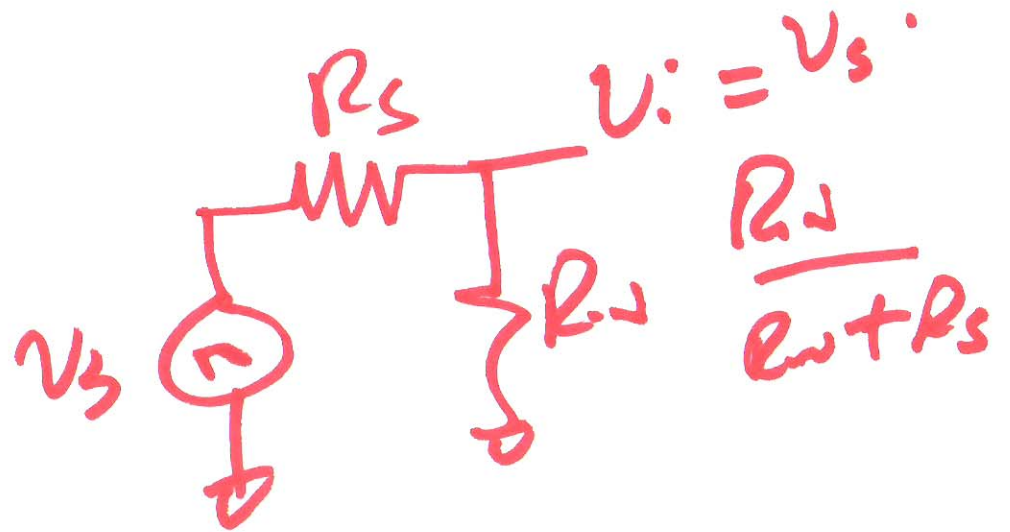
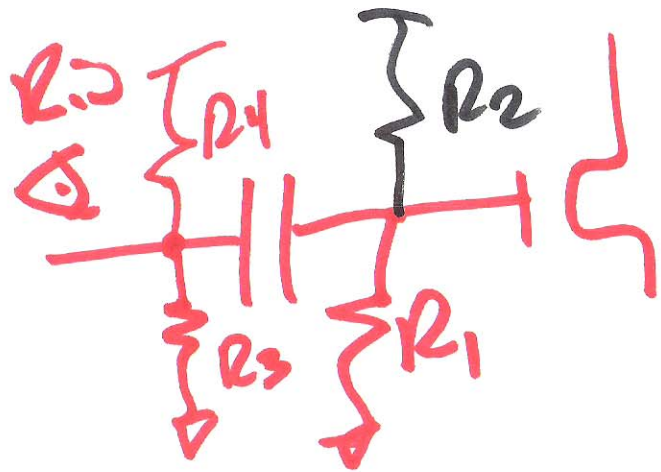
good quiz question

$$i_d = g_m v_{gs}$$

$$\frac{v_{gs}}{i_d} = \frac{1}{g_m} = \frac{0 - v_T}{-i_T}$$

$$R_{out \text{ to source}} = \frac{1}{g_m}$$

b)



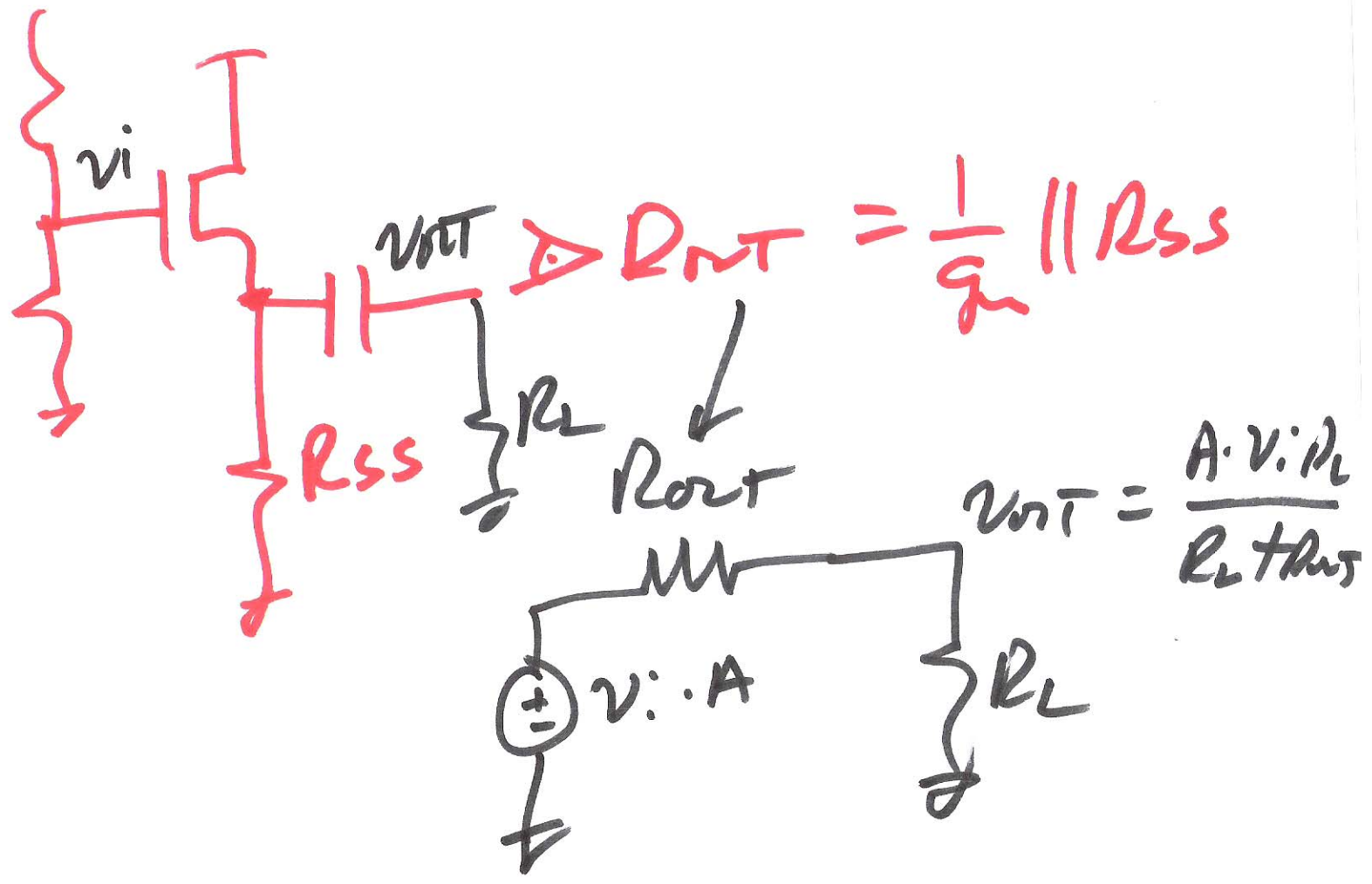
$$R_{in1} = R_1$$

$$R_{in2} = R_1 \parallel R_2$$

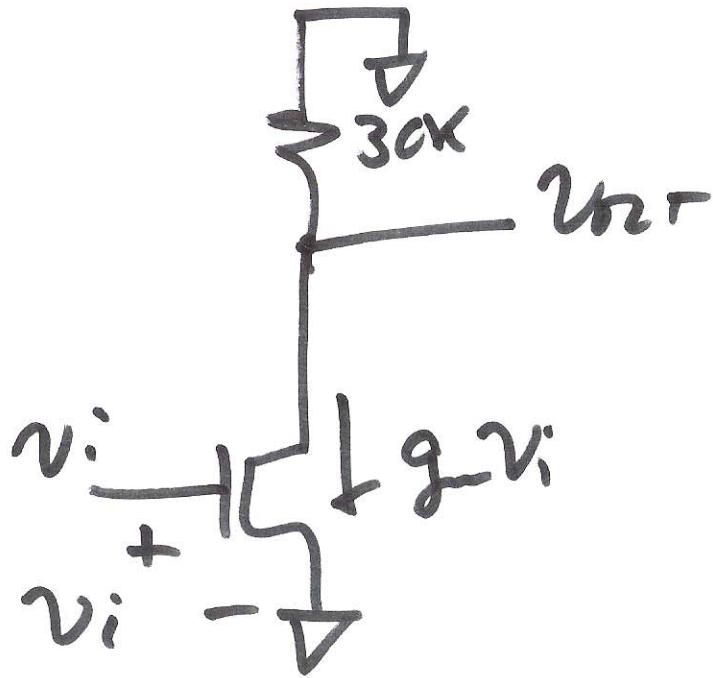
$$R_{in3} = R_1 \parallel R_2 \parallel R_3$$

$$R_{in4} = R_1 \parallel R_2 \parallel R_3 \parallel R_4$$

7)



8)

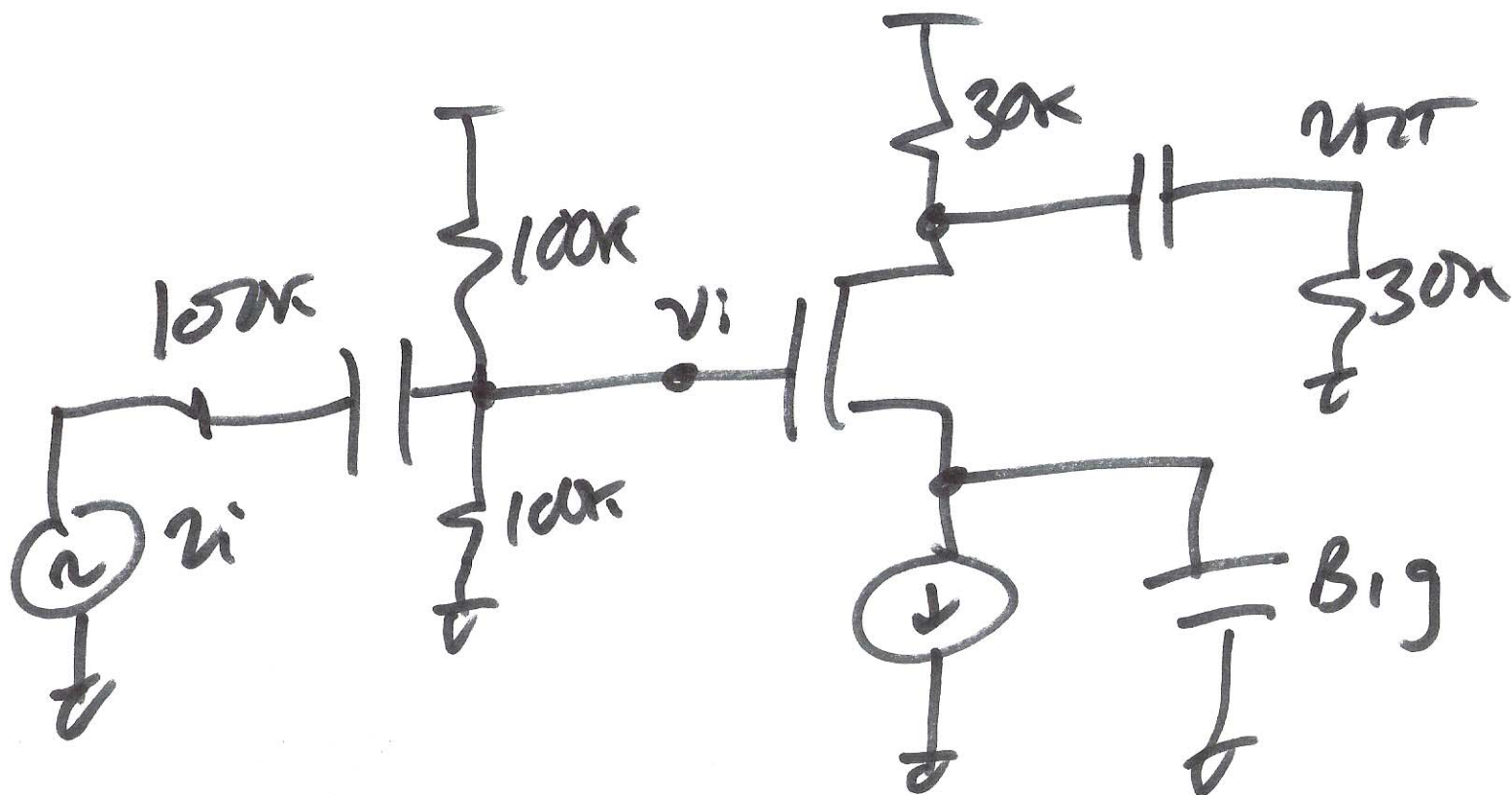


$$v_{out} = -g_m v_i \cdot 30k$$

$$\frac{v_{out}}{v_{in}} = -g_m \cdot 30k$$

$$= -1.55 \cdot 30$$

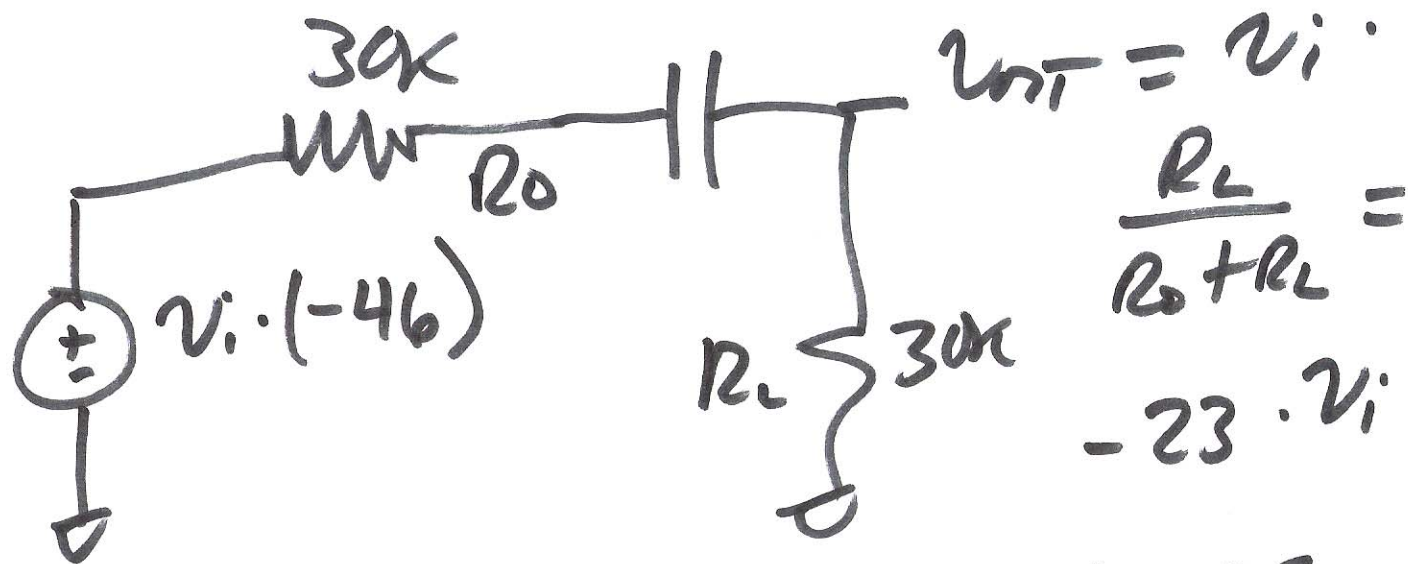
$$\frac{v_{out}}{v_i} = -46.$$



$$\frac{v_o}{v_i} = ? = -g_m \cdot 15k = -g_m \cdot 30k \parallel 30k$$

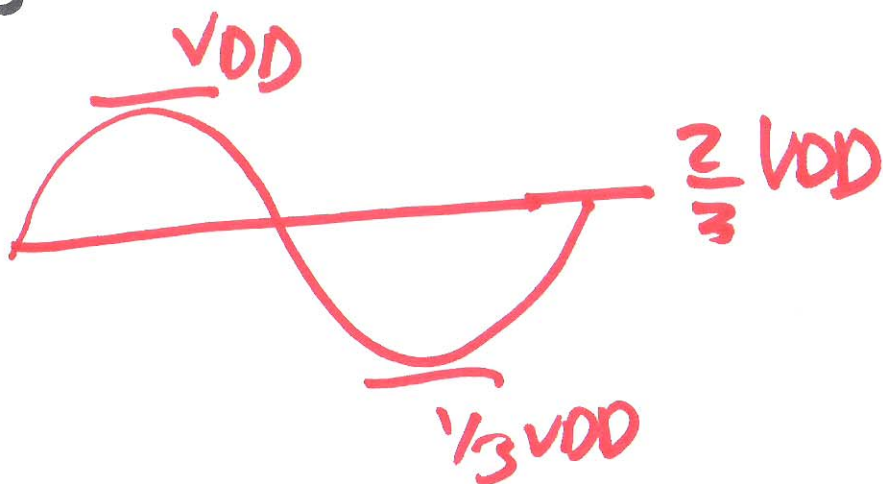
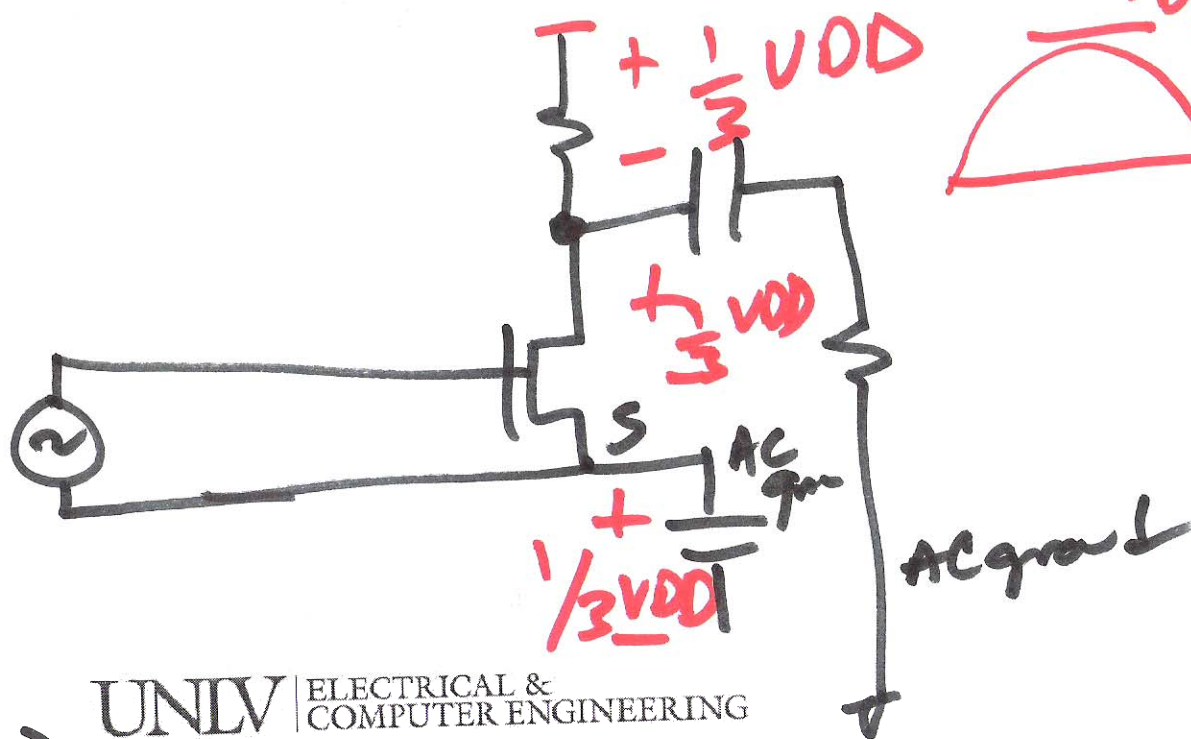
$$\frac{v_o}{v_i} = -23$$

11)



C. S. A ~ P S

Designing



(2)