Homework Assignment #7

ECE 0257 – Spring 2019

Name

Avery Peiffer

Collaborators

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Book Problems

Sedra & Smith 7.118 [Parts (a) and (b) only]

Sedra & Smith 7.121

Sedra & Smith 8.1 (Only answer the first part posted below)

Sedra & Smith 8.36

Check-list Before Submission

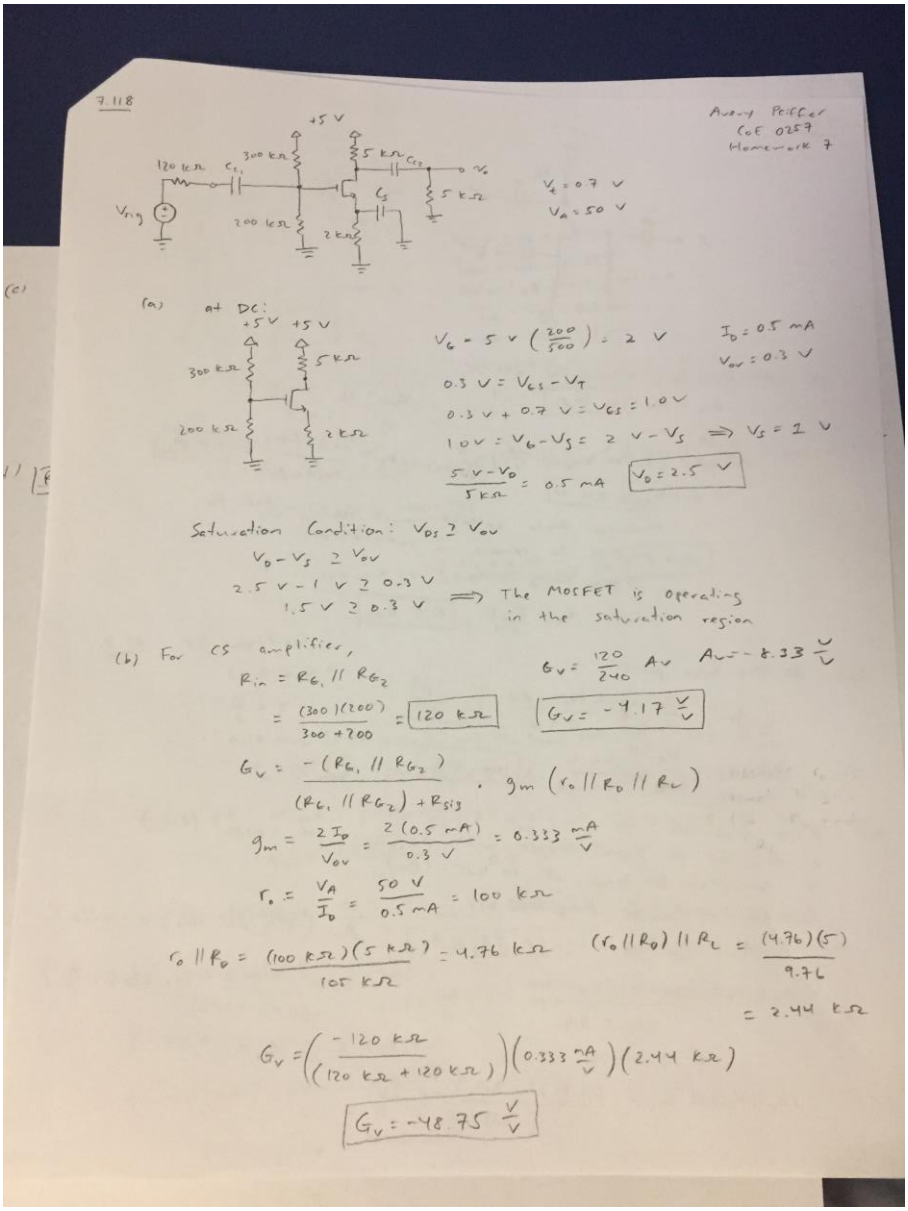
☐ Write within boxes, no boxes are moved

☐ Write your full names in designated area

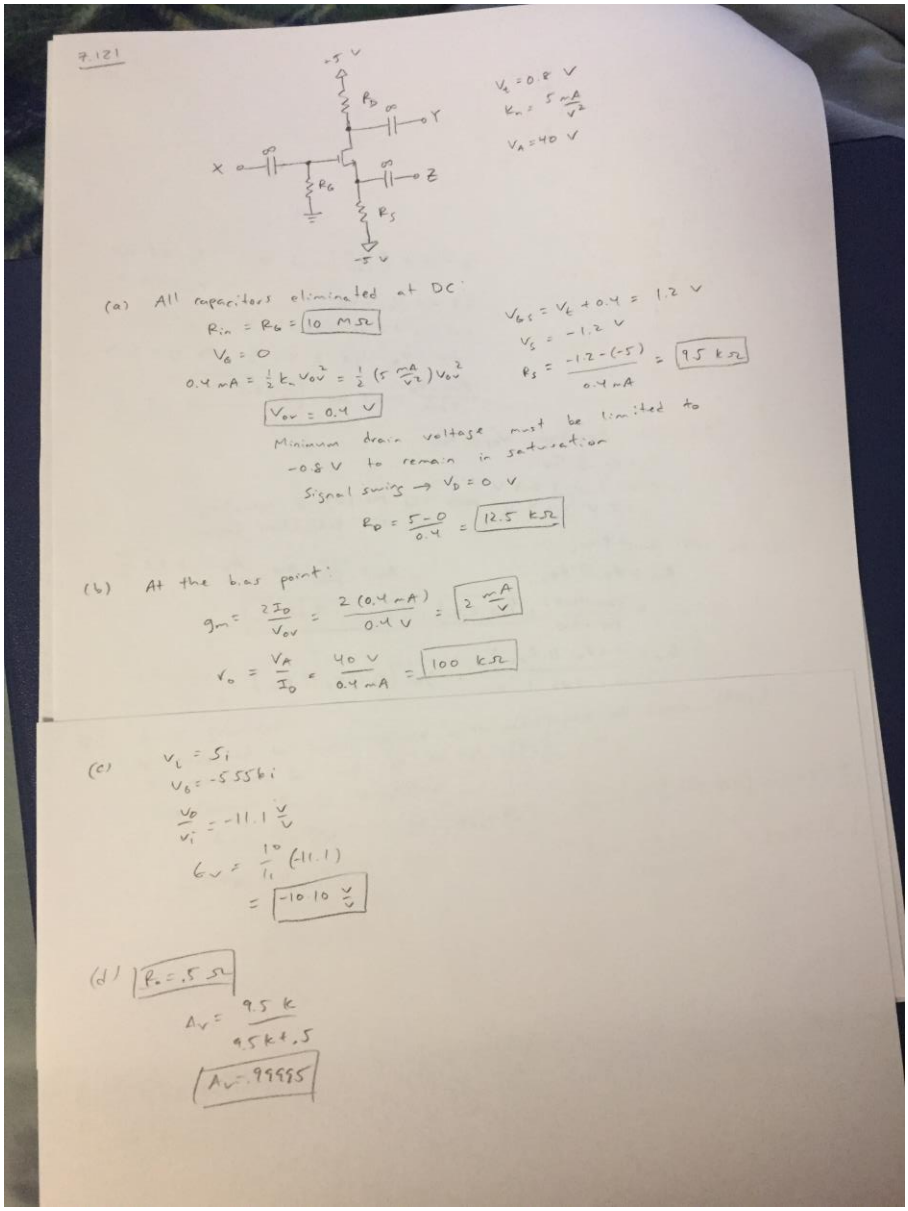
☐ Save this file as a PDF before uploading, keep the number of pages (**8**) unchanged

☐ Notify "TO BE CONTINUED" accordingly if you used the extra pages (page 6-8)

Sedra & Smith 7.118 [Parts (a) and (b) only]



Sedra & Smith 7.121



7.121

$V_t = 0.8$ V
$K_n = 5 \frac{mA}{V^2}$
$V_A = 40$ V

(a) All capacitors eliminated at DC

$R_{in} = R_G = \boxed{10\ M\Omega}$

$V_G = 0$

$0.4\ mA = \frac{1}{2} k_n V_{ov}^2 = \frac{1}{2}\left(5 \frac{mA}{V^2}\right) V_{ov}^2$

$\boxed{V_{ov} = 0.4\ V}$

$V_{GS} = V_t + 0.4 = 1.2$ V

$V_S = -1.2$ V

$R_S = \frac{-1.2 - (-5)}{0.4\ mA} = \boxed{9.5\ k\Omega}$

Minimum drain voltage must be limited to -0.8 V to remain in saturation

Signal swings → $V_D = 0$ V

$R_D = \frac{5 - 0}{0.4} = \boxed{12.5\ k\Omega}$

(b) At the bias point:

$g_m = \frac{2 I_D}{V_{ov}} = \frac{2(0.4\ mA)}{0.4\ V} = \boxed{2 \frac{mA}{V}}$

$r_o = \frac{V_A}{I_D} = \frac{40\ V}{0.4\ mA} = \boxed{100\ k\Omega}$

(c) $v_L = v_i$

$v_o = -555 v_i$

$\frac{v_o}{v_i} = -11.1 \frac{V}{V}$

$G_v = \frac{10}{11}(-11.1)$

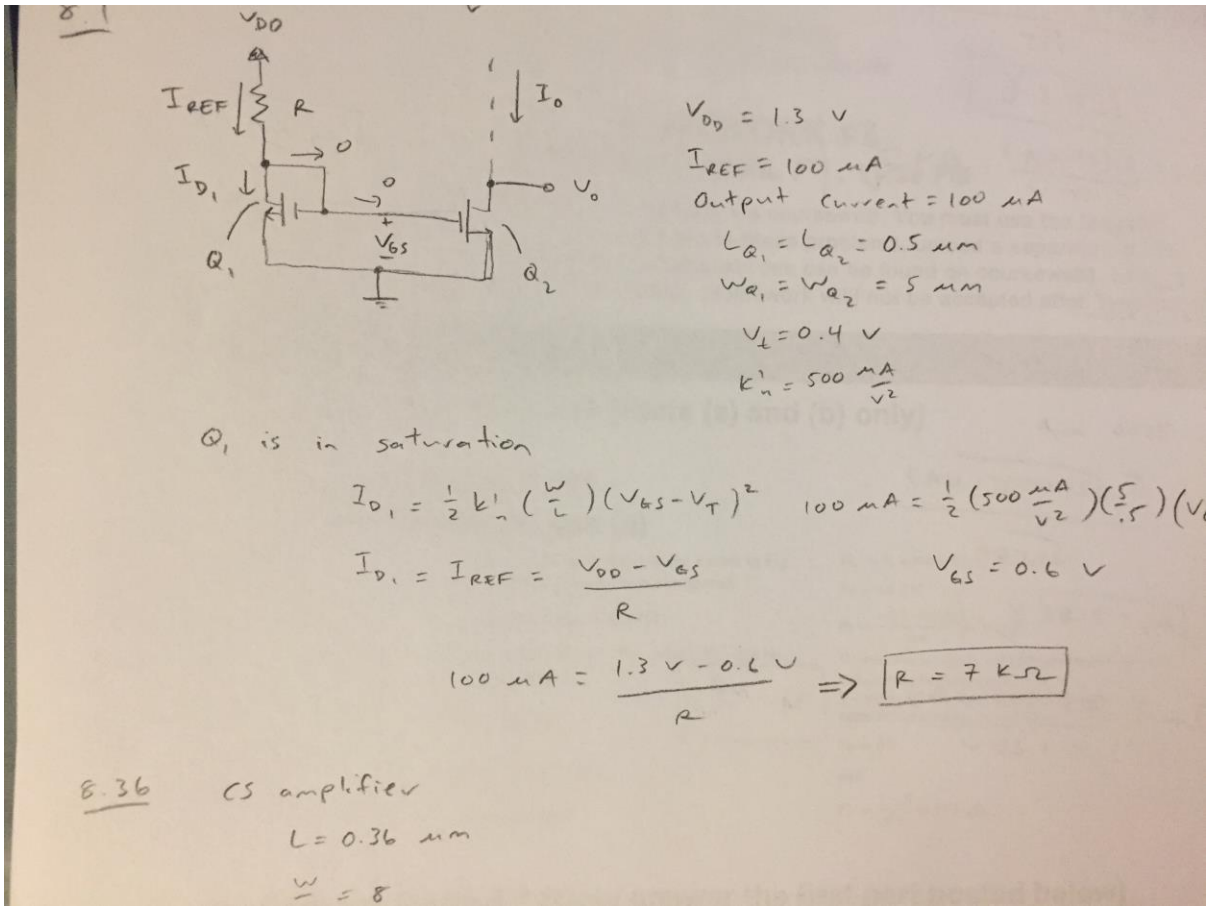
$= \boxed{-10.10 \frac{V}{V}}$

(d) $\boxed{R_s = .5\ \Omega}$

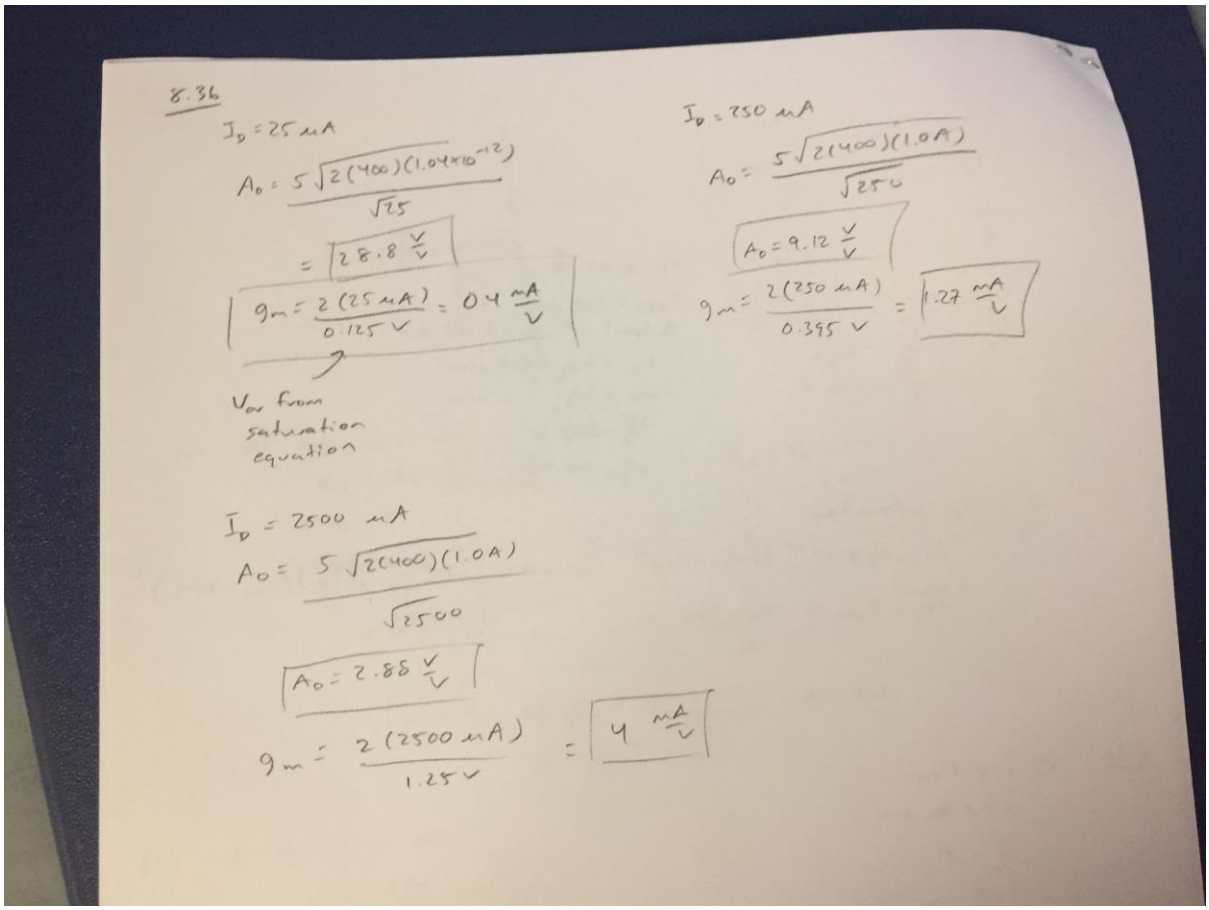
$A_v = \frac{9.5\ k}{9.5\ k + .5}$

$\boxed{A_v = .99995}$

Sedra & Smith 8.1 (Only answer the first part posted below)



Sedra & Smith 8.36



EXTRA PAGES

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