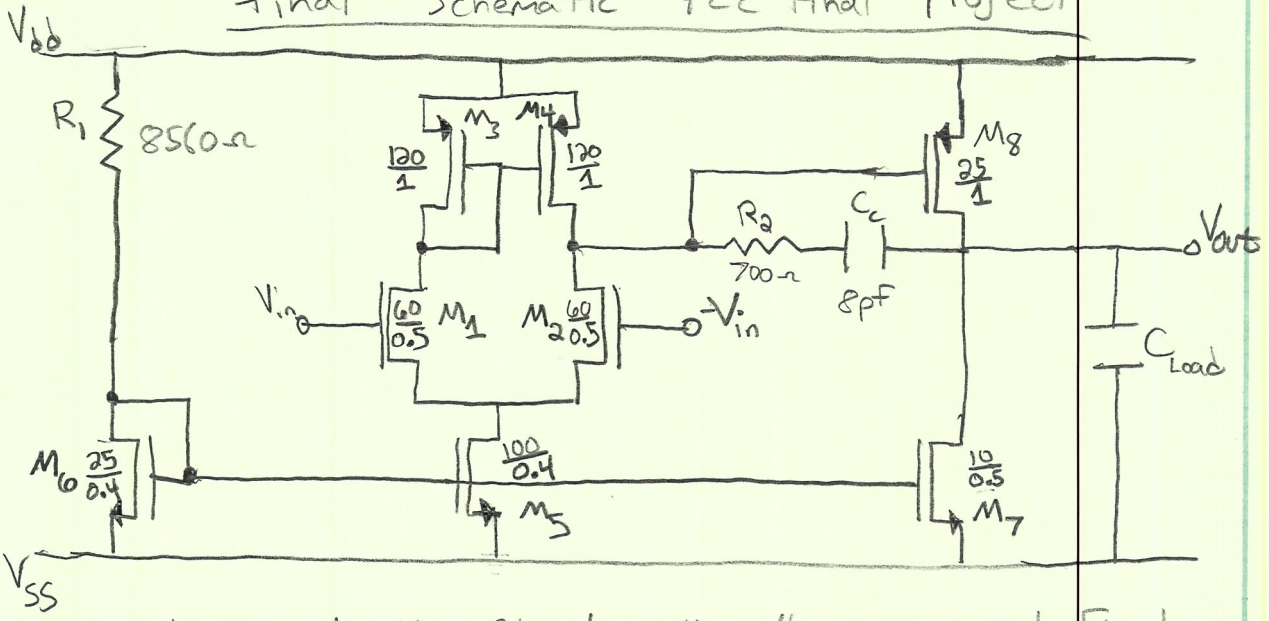
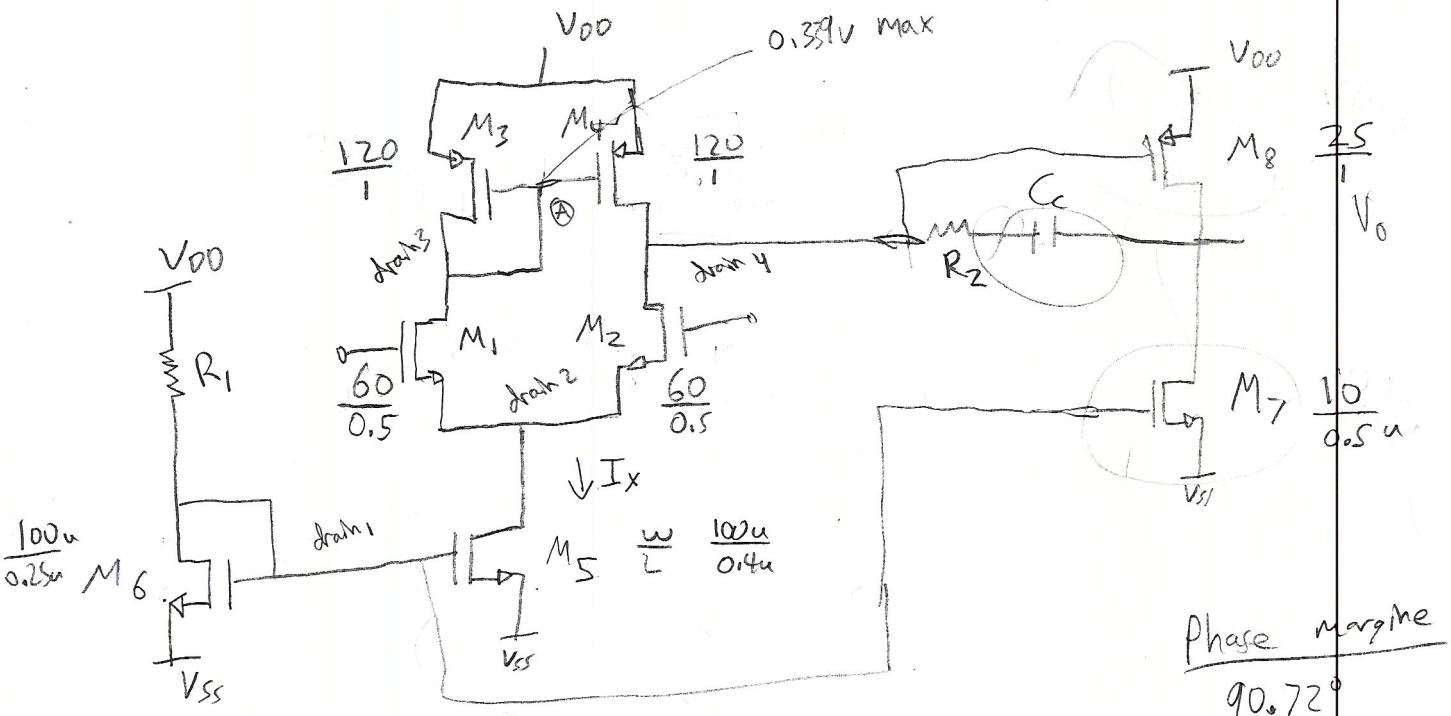
# Final Schematic 422 final Project




look at this Schematic the others are not final




Phase margine
90.72°

$I_X = 600\mu A$

$r_1 = \frac{1.16614v}{600\mu A} = \boxed{8560\Omega}$ $R_1$

$\frac{1}{g_{m4}}$ $\frac{M_6}{M_8}$

Makes lengths larger.

To calculate $R_2$ I am using the same topology as in the notes. Using the $\frac{1}{g_{m4}}$ to Cancel out One of the Poles.

$g_{m4} = \sqrt{2 k_n' \left(\frac{W}{L}\right) I_D}$

$I_D = 300\mu A$

$k_n' = 235 \times 10^{-6} \frac{A}{V^2}$

$\left(\frac{W}{L}\right) = 120$ Since $W = 60u$, $L = 0.5u$

$r_{08} \| r_{07}$

$r_{08} \approx r_{07} \approx \frac{1}{(0.1)(600\mu A)}$

$g_{m4} = \sqrt{2(235\times10^{-6})(120)(300\times10^{-6})}$

$g_{m4} \approx 4.11ms$ $\frac{1}{g_{m4}} \approx 243\Omega$

$R_2$ needs $> 243\Omega$

Now using $W_z = \frac{1}{C_c\left\{\frac{1}{g_{m2}} - R_z\right\}}$

chose 8pf for $C_c$

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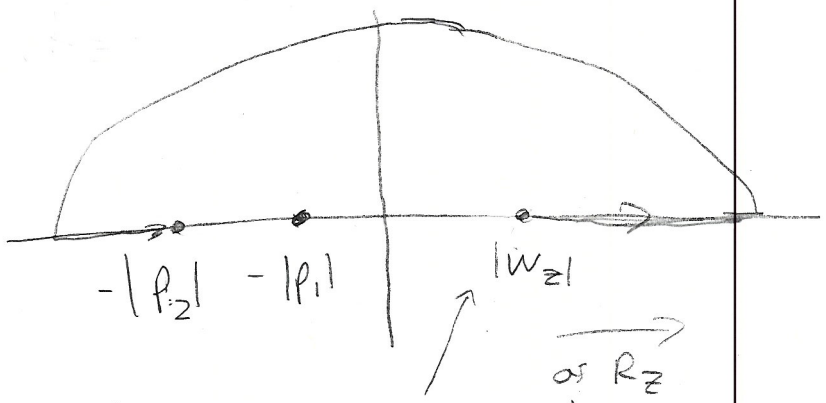
$$W_z = \frac{1}{8pf\left\{\frac{1}{4.11ns} - R_z\right\}}$$



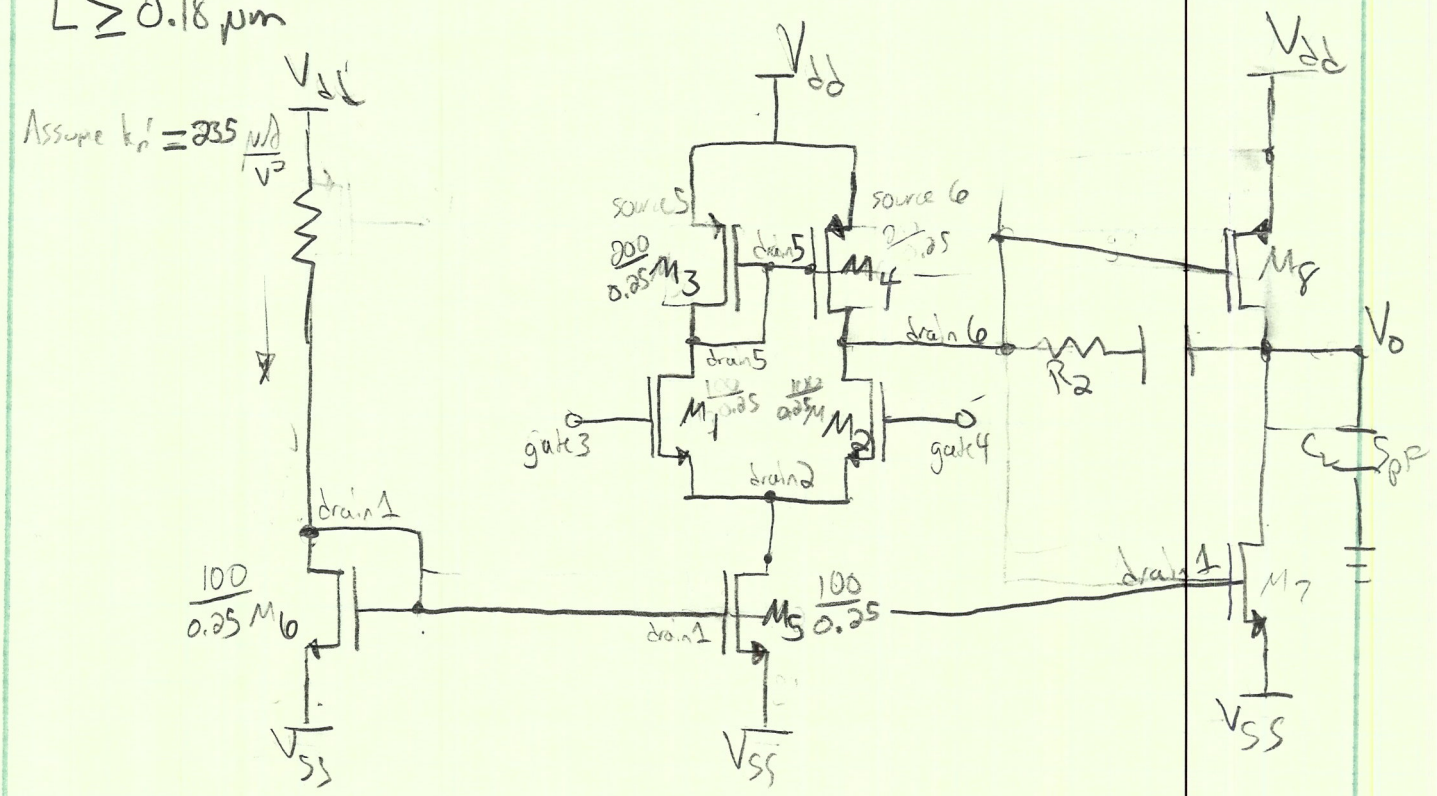

$$W_z = \frac{1}{8pf(243-700)}$$

$W_z = -2.73 \times 10^8$ pushed ~ to the left.

at this point $R_z \approx 243\,\Omega$

So we chose 700 Ω which pushed our zero to the LHS Canceling with one of the poles.

$L \geq 0.18\ \mu m$




$$V_{dd} - V_{ov_{M8}} = V_{o_{max}}$$

$$V_{ov_{M8}} = \sqrt{\frac{2 I_D}{k_p' \left(\frac{W}{L}\right)}} = \sqrt{\frac{2 (53.35 \times 10^{-6})}{(235 \times 10^{-6})\left(\frac{25}{1}\right)}} = 0.135\ V$$

$$V_{o_{max}} = 0.9V - 0.135V = 0.765\ V$$

$$V_o - V_{ov_{M7}} = -0.9V$$

$$V_{o_{min}} = V_{ov_{M7}} - 0.9V$$

$$V_{ov_{M7}} = \sqrt{\frac{2 I_D}{k_n' \left(\frac{W}{L}\right)}} = \sqrt{\frac{2 (53.35 \times 10^{-6})}{(235 \times 10^{-6})\left(\frac{10}{0.5}\right)}} = 0.151\ V$$

$$V_{o_{min}} = -0.749\ V$$