1. In the circuit of Fig. 1, ignore all device capacitance. Include only $C_{GS1}$, $C_{GS3}$, and $C_o$ in your calculations. Take $\lambda n = 0.01$ and all $V_{DSAT} = 200$ mV. Also take $C_{GS1} = C_{GS2} = 1$ pF and $C_o = 100$ nF. Assume M1-3 are active.

**Fig. 1**

a. Determine the poles of the amplifier of Fig. 1 if $R_F = \infty$, i.e. if $R_F$ is removed.

b. If the amplifier of Fig. 1 with $R_F = \infty$ was connected in a unity gain connection, i.e. connect $V_{in}$ to $V_o$, would the circuit be stable? Explain.

c. Determine the poles of the amplifier with $R_F = 10k\Omega$.

d. Determine the low frequency gain of the amplifier if $R_F = 10k\Omega$.

e. Estimate the frequency of the lowest pole in a unity gain feedback connection with $R_F = 10k\Omega$, i.e. connect $V_{in}$ to $V_o$. 
In the circuit shown in Fig. 2, estimate the settling time for 0.1% error for an input step amplitude $V_i = 2V$ into the amplifier below. Neglect all capacitors except the three that are explicitly shown. $V_{DSAT} = 200mV$ (all device). Assume all devices in saturation, amplifier is stable and $\lambda_n = \lambda_p = 0.1$. 

![Fig. 2](image-url)