

Figure 1: Circuit for Simulation 1

The value of V_{GS} for which $I_D = 500\mu A$ is listed in table (1). g_m is determined from a DC operating point analysis in Virtuoso as well as from the plot in figure (2).

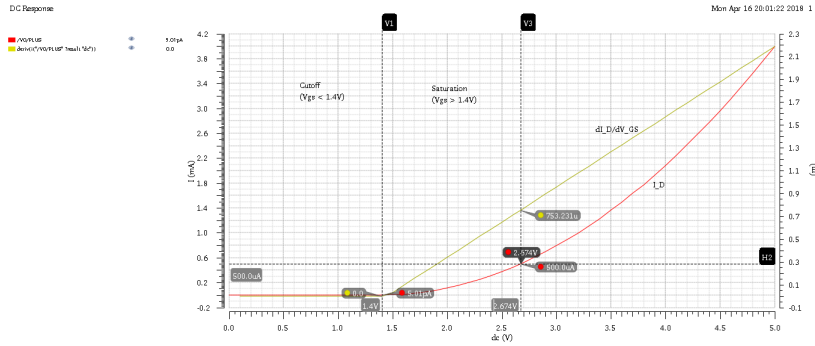


Figure 2: I_D and $\frac{\partial I_D}{\partial V_{GS}}$ versus V_{GS} for NMOS

It should be noted that the transistor is always in saturation when it is not in cutoff since $V_{DS} = 5V$ and $V_{GS} < 5V$, which implies $V_{GS} - V_t < V_{DS}$. By definition, $g_m = \frac{\partial I_D}{\partial V_{GS}}$. So, g_m can be determined from the graph at the point when $I_D = 500\mu A$.

Table 1: Simulation 1 Results			
Vgs [V]	gm from DC operating point simulation [uA / V]	gm from Graph [uA / V]	Percentage Error
2.674	784	752.231	4.05%