1) Calculate the minimum capacitance necessary for a 8, 10, 12, 14, 16, 18 and 20 bit system. Plot $C_{\text{min}}$ vs number of bits of resolution. Assume a 2.5V supply.

2) For strong inversion and saturation the drain to source current is given by

$$I_{ds} = \frac{kW}{2L} (V_{gs} - V_t)^2 (1 + \lambda V_{ds})$$

Likewise for weak inversion and “saturation” the drain to source current is given by

$$I_{ds} = I_{do} \frac{W}{L} V_{gs} e^{nU_T} \left(1 + \lambda V_{ds}\right)$$

Find a “fitting” function for moderate inversion. The fitting function should be continuous in $I_{ds}$, $g_m$ and $g_{ds}$.