

ECE 441 (Spring 2009) HW #12
Due: **Friday, May 1st, 2009**

1. Muller & Kamins 9.12.
2. Muller & Kamins 9.17.
- 3.

Using the following equation

$$dV_c(y) \approx \frac{I_D dy}{\mu_n C_{ox} W [V_G - V_T - V_c(y)]}$$

to derive equations for the potential $V_c(y)$ and the electric field $E_c(y)$ along the channel. Note that the drain current I_D is a constant along the y direction, y is the distance from the source, L is the source-drain separation and V_{DS} , V_G , V_T are the drain, the gate and the threshold voltages, respectively. Assume $V_S = V_B = 0V$.

(b). From the expressions derived, obtain the equation for the electric field $E_c(y)$ along the channel that is valid when the MOSFET is at the edge of saturation. For $L = 10\mu m$, $V_G - V_T = 5V$, calculate the source side electric field E_s .