Lab 9 pre lab:

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Task 1:

Channel length modulation (CLM) is a phenomenon in MOSFETs where the effective length of the conducting channel between the source and drain terminals decreases as the drain-source voltage increases. Due to this, in MOSFET: the channel width increases, drain current increases, effective channel width-to-length ratio increases. Channel length modulation introduces a finite Early voltage, which reduces the transistor's effective Early voltage from an ideal infinite value. The increase in output conductance decreases the MOSFET's output resistance, as Gds increases so Ro decreases. Channel length modulation changes the drain current characteristics of the MOSFET, particularly at higher drain-source voltages.

Task 2:

MOSFET gate capacitance is the capacitance between the gate terminal and other terminals (source and drain), consisting of two main components: overlap capacitance and oxide capacitance. Overlap capacitance is due to the overlapping area between the gate electrode and source/drain regions, while oxide capacitance is resulting from the insulating oxide layer between the gate electrode and semiconductor channel.