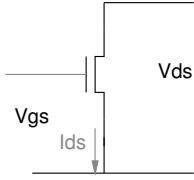
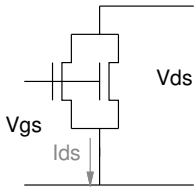
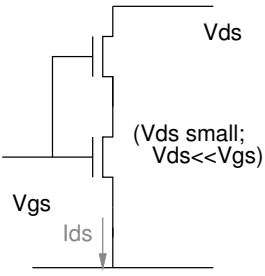
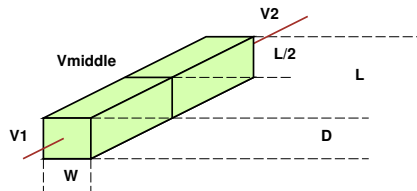


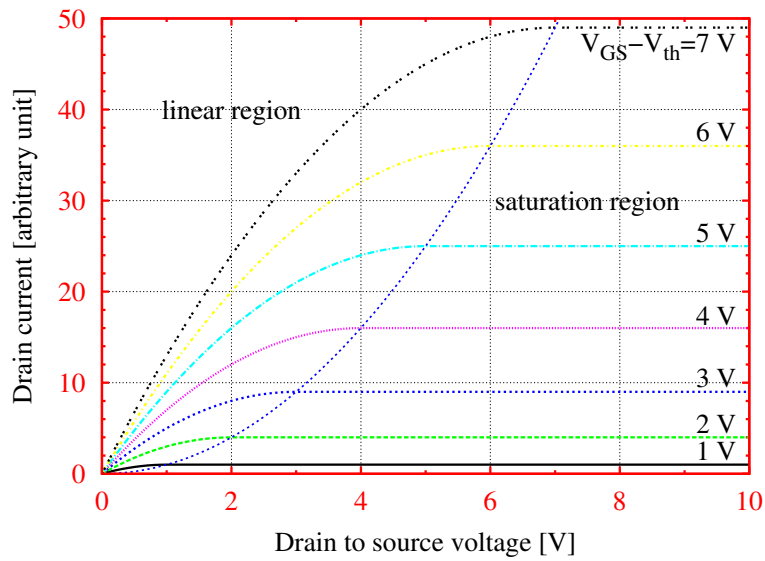
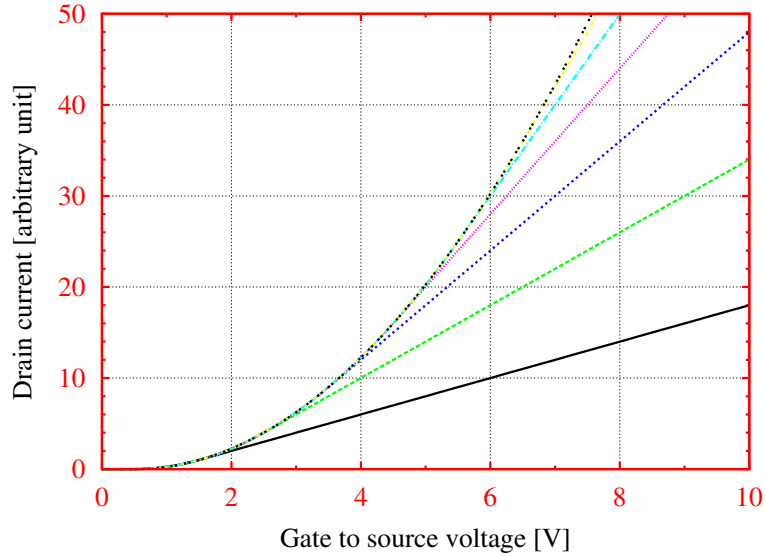
1. Fill in the missing currents:

Circuit	Current I_{ds}
	$1 \mu A$ (given)
	
	

2. Consider a resistor built from a resistive medium that is L units long in the direction of current flow, W units, and D units deep.



If we could insert a metal contact at $L/2$ and measured the voltage, how would that voltage (V_{middle}) relate to the endpoint voltages V_1 and V_2 ?



V_{GS}	V_{DS}	Mode	I_{DS}
$> V_{th}$	$< V_{GS} - V_{th}$	Resistive	$\mu_n C_{OX} \left(\frac{W}{L}\right) \left((V_{GS} - V_{th}) V_{DS} - \frac{(V_{DS})^2}{2} \right)$
	$> V_{GS} - V_{th}$	Saturation	$\frac{\mu_n C_{OX}}{2} \left(\frac{W}{L}\right) (V_{GS} - V_{th})^2$
$< V_{th}$		Subthreshold	$I_S \left(\frac{W}{L}\right) e^{\frac{V_{GS} - V_{th}}{nkT/q}} \left(1 - e^{-\frac{V_{DS}}{kT/q}} \right)$