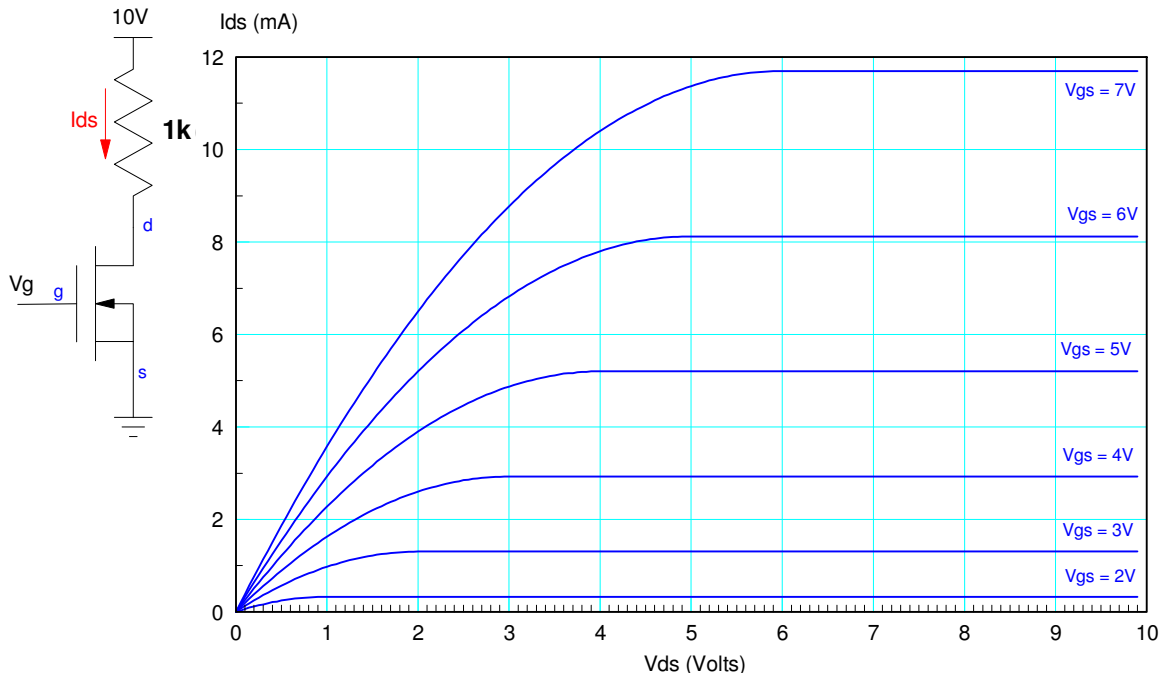


ECE 320 - Homework #9

MOSFETs, MOSFET switch, CMOS logic. Due Monday, March 22nd

MOSFETs

- 1) The VI characteristics for an n-channel MOSFET is shown on the following page. Assume $V_{th} = 1.0V$
 - Determine the transconductance gain, k_n
 - Label the off / saturated / ohmic regions in the curve below.
- 2) Draw the load line and mark the operating points for $V_g = \{ 0V, 4V, 7V \}$

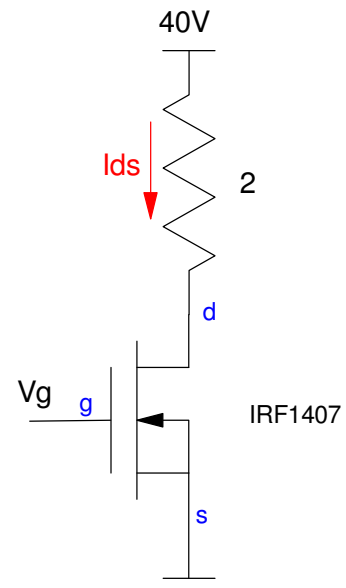


MOSFET Switch

One of the MOSFET's that CircuitLab has is an IRF1047. It's specifications are

- $\max(I_c) = 100A$ continuous
- $V_{gs(th)} = 4V$ (max)
- $R_{ds} = 7.8m\Omega$ @ $I_{ds} = 78A$ @ $V_{gs} = 10V$
- \$0.53 each

- 3) Determine the transconductance gain, k_n , for this MOSFET. Assume $V_{tn} = 4.00V$
- 4) Determine the voltages and currents for the following circuit when $V_g = 5V$
 - Check your result in CircuitLab
- 5) Determine the voltages and currents for the following circuit when $V_g = 10V$
 - Check your result in CircuitLab



CMOS Logic

6) Design a CMOS gate to implement the function: $f(A, B, C, D)$

f(A,B,C,D)		CD			
		00	01	11	10
AB	00	1	0	0	0
	01	1	1	0	1
	11	x	x	x	x
	10	1	1	x	x