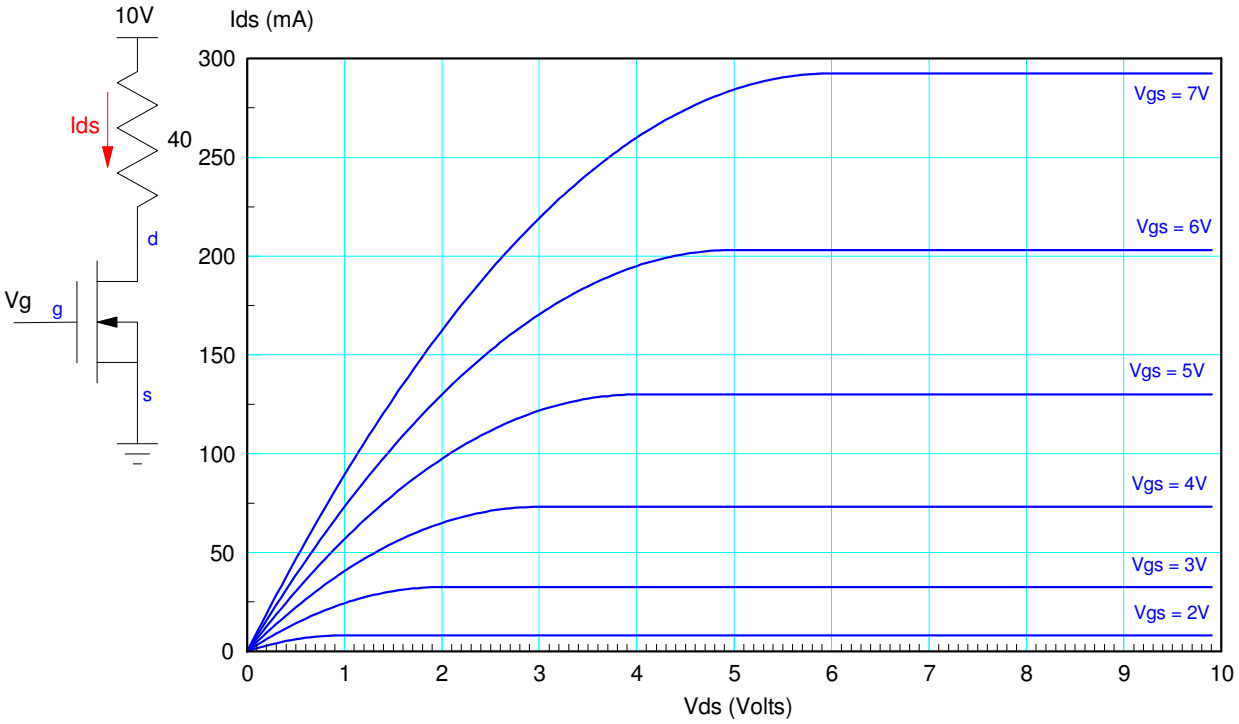
ECE 320 - Homework #9

MOSFET Switches, CMOS logic. Due Monday, March 21st

MOSFETs

1) The VI characteristics for an n-channel MOSFET are shown below.
   - Label the off / ohmic / and saturated regions
   - Determine the transconductance gain, kn. Assume Vth = 1.00V

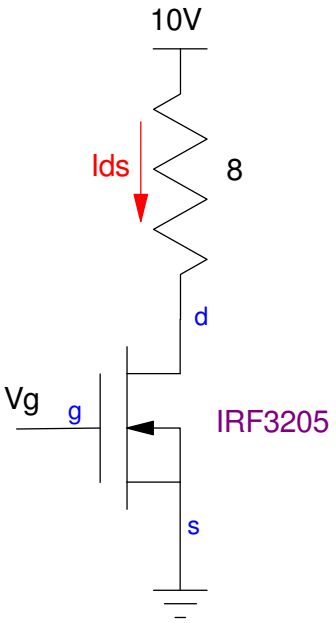
2) Draw the load-line for the circuit below. From the load line, determine the Q-point (Vds, Ids) when
   - Vg = 0V
   - Vg = 4V
   - Vg = 7V



MOSFET Switch

The characteristics for a IRF3205 MOSFET are

- Max Current = 110A continuous
- Rds = 0.008 Ohms @ 62A # 10V
- Vth = 4.00V (max)



3) Determine the transconductance gain, kn

4) Determine the voltages for the following circuit for

- Vin = Vg = 0V
- Vin = Vg = 5V
- Vin = Vg = 10V

5) Simulate this circuit in CircuitLab using an IRF3205 MOSFET. (you may need to adjust the parameters to match your calculations for kn and Vth). Determine the voltages and currents when

- Vin = Vg = 0V
- Vin = Vg = 5V
- Vin = Vg = 10V
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CMOS Logic

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

Y(A,B,C,D)

AB \ CD	00	01	11	10
00	1	1	1	x
01	0	0	0	1
11	1	x	1	0
10	x	1	x	0