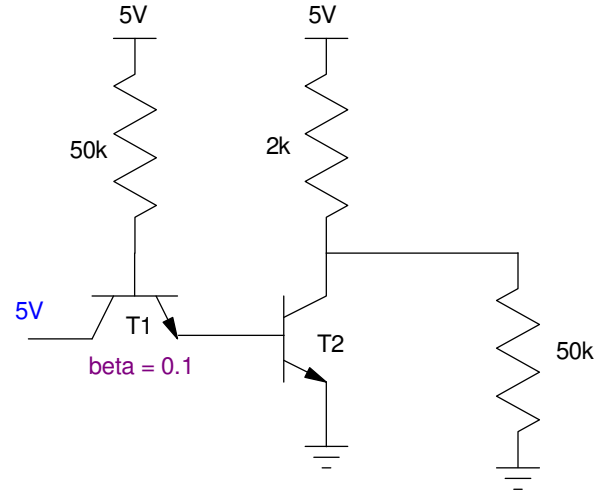
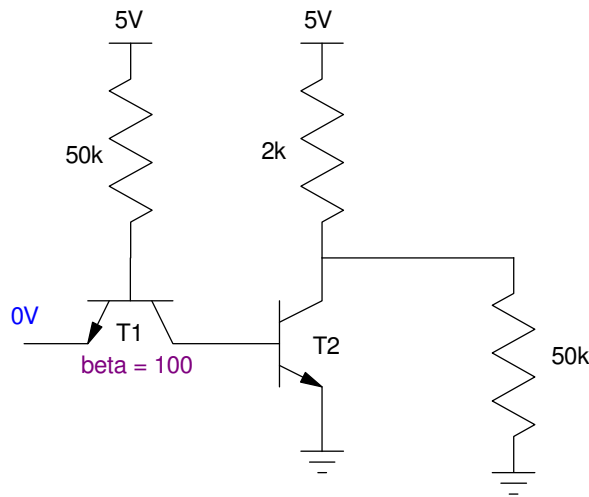


ECE 320 - Homework #9

TTL Logic. MOSFETs. Due Monday, October 15th, 2018

TTL Logic

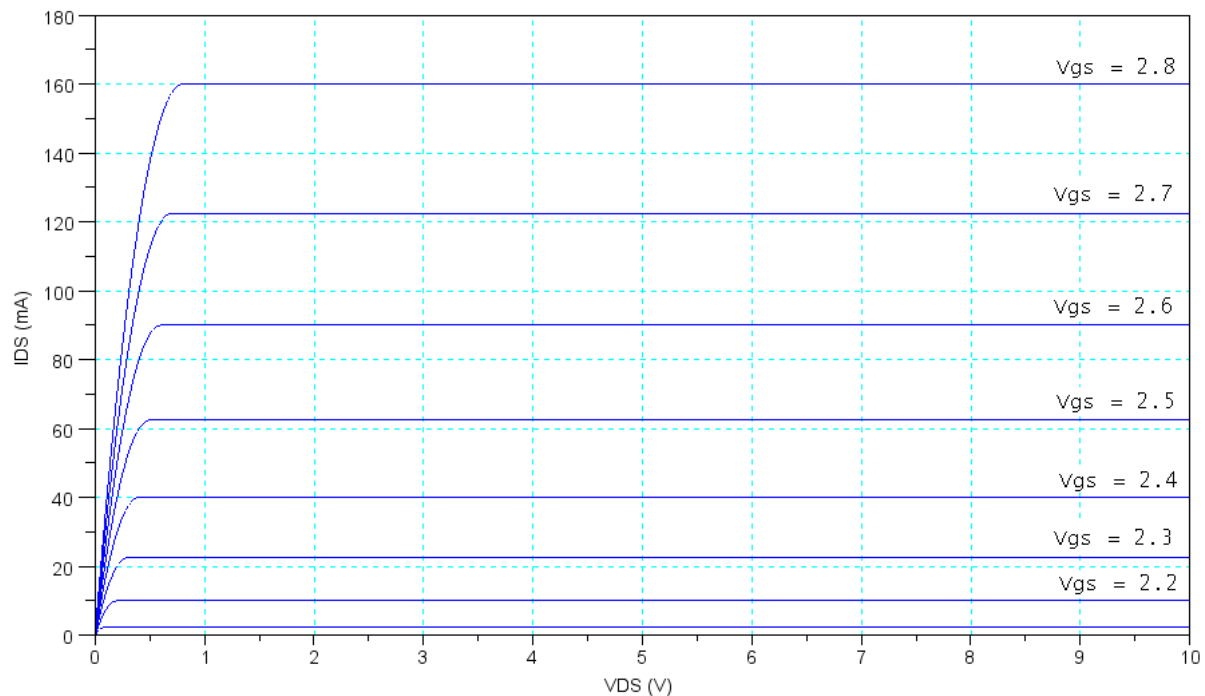
1) Determine the voltages and currents for the following TTL inverter. Assume T2 has a current gain of 100



MOSFET

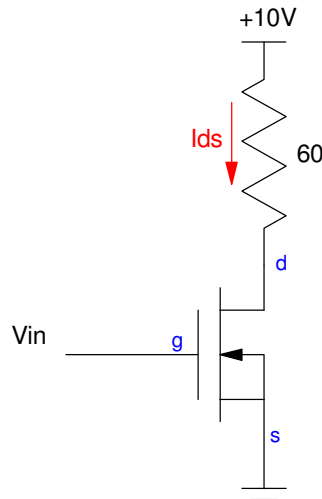
2) The VI characteristics for a MOSFET are shown below.

- Label the Off / Saturated / Ohmic regions
- Determine the transconductance gain, k_n



3) On the previous VI curve, draw the load-line for the following circuit. Determine the Q-point (V_{ds} , I_{ds}) for

	$V_{in} = 0V$	$V_{in} = 2.4V$	$V_{in} = 2.8V$
V_{ds}			
I_{ds}			
Operating Region			



Problem #3

MOSFET Switch

4 The characteristics for an IRLI520NPBF-ND n-channel MOSFET is:

- max V_{dss} : 100V
- Current - Continuous Drain (I_d) @ 25°C 8.1A (T_c)
- 0.18 Ohms @ $V_{gs} = 10V$ @ $I_d = 6A$
- $V_{gs(th)} = 2V$ (max)
- Gate Charge (Q_g) (Max) @ $V_{gs} = 20nC$ @ 5V

Determine the transconductance gain, k_n .

5) Using this op-amp, design a circuit to turn on and off a DC motor at 24VDC with a maximum current of 5A:

- Input: 0V / 10V binary signal capable of up to 10mA
- Output: 24V DC motor drawing up to 5A
- Relationship:
 - 0V in turns off the motor (0A)
 - 10V in turns on the motor (24V applied to the motor, +/- 1V)

6) Determine the current for your circuit in problem #4 when

- $V_{in} = 0V$
- $V_{in} = 5V$
- $V_{in} = 10V$