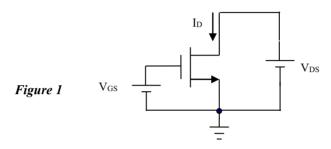| SANTA CLARA UNIVERSITY	ELEN 115 Spring 2023	Dr. S. Krishnan
Laboratory #6: MOSFET characteristics and MOS as a switch		

II. PRE-LAB

Part 1: MOSFET i-v characteristics

For the transistor use: $V_{to} = 0.6V$, $k' = 30\mu A/V^2$, $\lambda = 0$, $W = 100\mu m$, $L = 1\mu m$

Figure 1

For each of the below voltage inputs given to the MOSFET as shown in Figure 1.

Find the region of operation and the value of the current I_D of the MOSFET

    (a) $V_{GS} = 0.5V$, $V_{DS} = 1V$
    (b) $V_{GS} = 0.5V$, $V_{DS} = 2V$
    (c) $V_{GS} = 1V$, $V_{DS} = 0.4V$
    (d) $V_{GS} = 1V$, $V_{DS} = 2V$
    (e) $V_{GS} = 2.5V$, $V_{DS} = 1V$
    (f) $V_{GS} = 2.5V$, $V_{DS} = 2.5V$

Also draw a rough sketch of the i-v characteristic and indicate the points you have calculated.

Part 2: CMOS Logic Gates

1. A two input CMOS NOR gate has input A and B and output OUT.
   a. Draw the schematic of the logic gate using NMOS and PMOS transistors.
      You can use the 3 input symbol for the MOSFETS.
   b. Clearly show the pull down network and the pull up network.
   c. For an input of A = 0 and B = 1 show the ON and OFF state of the MOSFETs and what value the OUPUT gets and why.
   d. For an input of A = 0 and B = 0 show the ON and OFF state of the MOSFETs and what value the OUPUT gets and why.