BRAC University (Department of Computer Science and Engineering)
CSE 460 (VLSI Design) | Fall 2023

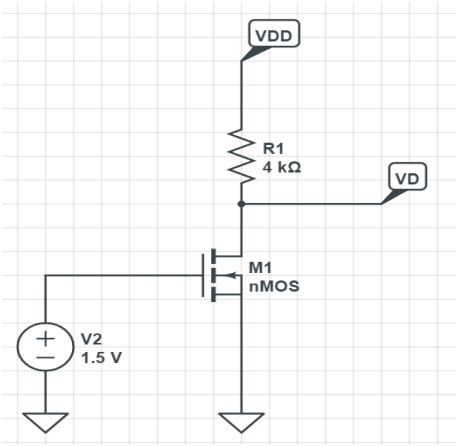
Assignment 1

1. Design the simplest sum-of-products circuit that implements the function **f (x1, x2, x3) = ∑m(3, 4, 6, 7). Using K-maps**
2. Design the simplest sum-of-products circuit that implements the function **f (x1, x2, x3) = ∑m(1,3, 4, 6, 7). Using K-maps**
3. Design the simplest circuit that has three inputs, x1, x2, and x3, which produces an output value of 1 whenever exactly one or two of the input variables have the value 1; otherwise, the output has to be 0. [hint: you have to make the truth table first, then use K-map to simplify]
4. Repeat Problem 2 for the function f (x1, x2, x3) = m(1, 4, 7) + D(2, 5).
5. find the minimum sum-of-products expression for the function **f = x1x3 + x1(x2)' + (x1)'x2x3 + (x1)'(x2)'(x3)'.**
6. Consider the following circuit where an n-channel MOSFET in 180nm process is shown. The following parameters are given for the **M1**, **[7 Marks]**

   μnCox = 100 μA/V2, Vt = 0.5 V, VDD=4V, VD=1V

   a. Calculate the current through the MOSFET and find the Necessary width W to attain that current.

   b. Again, assume that W=1.8 **μm.** Now find the value of **R1** that results in the given drain voltage VD.



7. Explain the behavior/operating region of a MOS with following I-V characteristics at points A and B with necessary equations