SANTA CLARA UNIVERSITY	ELEN 153	Prepared by Vinay Krishna , Mariela
Laboratory #4: Hierarchical Design : Two-Input XNOR Gate		

I. OBJECTIVES

- To create a schematic and symbol for a Two input XNOR gate
- To perform simulations to verify the XNOR's functionality.

II. LAB PROCEDURE

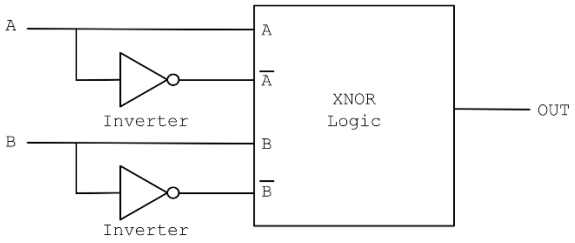
PART A: XNOR Logic schematic and Symbol

- Enter a schematic of a XNOR Logic using Synopsys Custom Compiler:
  Name your input pins: A, B, Abar, Bbar. Name your output pin as OUT.

  Note: For PMOS and NMOS device aspect ratios (W/L), size the devices to match the rise and fall time of the inverter created in Lab 2.

  Question: Explain the transistor sizing of above XNOR in your lab report?

- Do not make any changes to your XNOR Logic symbol. It should look like default Rectangle.



PART B: Four Inputs to Two Inputs using Inverters (Hierarchy)

- Using the above XNOR Logic symbol, and Inverters symbol from Lab 2, create a new schematic of Two input XNOR Gate as shown in above picture.
- Now, create a symbol by replacing the default rectangle with XNOR as below.
  - Import symbol (shift + T) → Sample (library) → xnr2 (cell)

PART C: Transient Simulation

In this section, we will perform a transient simulation to verify the XNOR's functionality.

- Create a new test-bench to simulate the XNOR gate:
- For inputs (A,B) of the XNOR, connect individual Pattern sources **Vpat** from **analoglib**.
- Setup the patterns in such a way it (00, 01, 10, 11) are produced. (ex. Vpat for A; **data** = b0011). Set the **sample time** as 200n and the **rise/fall time** as 10n
- Connect a load capacitance at OUT: CLOAD = 2pF
- Use SAE to setup a transient simulation with **time step** 10n, **stop time** 800n and plot all the inputs and outputs.
- Verify that the XNOR is operating as intended.

  Question: Measure the Rise and Fall time of the output and include the picture with the visible measurements.

III. REPORT

Write a short laboratory report that details all the work done. Describe the objective and procedures of this lab with your own words. The lab report should contain the following:

a) All schematics and testbenches used in your lab.
b) Simulation setup and all waveforms.
c) Answer any questions in the lab assignment
d) Conclusions