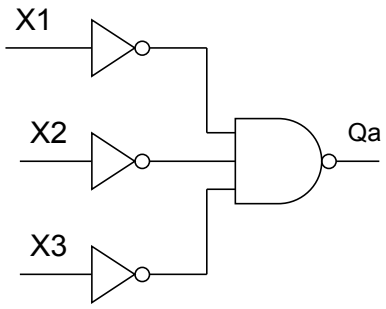
ECE 331 Digital System Design

Fall 2007 Nathalia Peixoto

HOMEWORK 1 – due September 4th at **≤6pm**

1. Show the truth table and write the boolean equation for the diagram below. (20pts)



2. Come up with a simpler circuit which does the same function. (10)
3. Write the VHDL code for both circuits (or for the first one only if you can't simplify it). (20)
4. Draw the circuit diagram and the truth table for the following formula: (20)

$$f = (g \cdot m) + (\overline{m} \cdot u) + ((g \cdot \overline{m} \cdot \overline{u}))$$

5. Find the data sheet for the 74LS04 online (tip: *google it*!)

   5.a – what is a 7404? (4)

   5.b – How low can you go with the power supply? _____ (4)

   5.c – How high can you go with the power supply? _____ (4)

   5.d – If you measure a logic '0' in the output of a SN74LS04, the voltage there must have been between the following values (in V): _____ and _____ (5)

   5.e – If the output just went from high to low, how long did it take? (6)

   5.f – You want to drive a certain LED which needs 5mA to turn on. With the 7404, would this work? And with the 5404? (explain why in one sentence!) (7)

6. Extra credit!!!! (10... or up to 10 – to a max of 100 in this HW)

You have a gate which can't drive your LED... what do you do to turn the LED on when the gate goes high (and off when it goes low)?

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Student:_____

Homework (>0 and <13):_____

Grade: _____

HOMEWORK FEEDBACK

First some "rules" to help us grade the homeworks:

- Start a **new page for each problem**.
- **Order** and **staple** your pages.
- Write your name on this cover page, which will be your first page, and on the first page of your homework.
- Always complete the reading assignments *before* attempting the homework problems.
- Show all of your work. Use written English, where applicable, to provide a log of your steps in solving a problem. (For numerical homework problems, the writing can be brief... or inexistent.)
- A solution which requires physical units is *incorrect* unless the units are listed in the result.
- Underline, circle or box your result.
- Always write neatly. Communication skills are essential in engineering and science. If neither the TA nor the instructor can read it, you will receive zero points.

After finishing your homework, complete this section:

- If you worked on it with classmates and your solutions might be TOO similar, write their names here:_____
- The homework helped you understand the topics it addresses? Yes □ □ □ □ □ □ □ □ □ □ No
- How long did it take you to work on the homework (don't count the reading assignment!)

  2h 4h 6h 8h 10h 12h infinite hours
- Do you have suggestions on how to improve it? (even ideas for new exercises?) Let us know here (and/or use the back of this sheet):