

# Homework Set 7

**DUE: Wednesday, November 28, 2001**

**Please show *all* of your work. In certain problems, you may be asked to use DesignWorks. Otherwise, solutions do not have to be typeset, but may be if desired. In any case, your solutions must be legible. Please staple all the pages together. Make it clear which problem is which (especially important for the printouts from DesignWorks).**

- 1)
  - a) Construct a 4-bit adder as a Verilog module in DesignWorks. Use the Verilog "+" operator to implement addition. You may use the module from the Mano handout or elsewhere if you wish (be sure to acknowledge the source). This time, it *is* important that you get the module working in DesignWorks. Refer back to the tutorial on the web page to the section on how to get going with Verilog. Make sure that your module includes a carry-out. Turn in your Verilog source code
  - b) Connect a keypad and probes to your Verilog adder block for testing. Verify that your adder works. Turn in printouts showing the following two tests:
    - i) "1111" + "0001"
    - ii) "1010" + "0101"
- 2) In DesignWorks or by hand, show how to implement a T flip-flop starting with a D flip-flop.
- 3) Katz. 7.3 (p.375). Read through problem 7.2 carefully before you try 7.3. You might even want to work 7.2 first, but you shouldn't hand it in. The 74194 is described on p.333-335. If you don't use DesignWorks, you might want to Xerox the 74194 symbol to paste on the page.
- 4) Katz 7.4 (a only)

[This one was postponed until HW8]

- 5) Katz 7.10, but use D flip-flops only. In part c, draw a new transition diagram to show the self-starting effect.