

Homework Set 5

DUE: Friday, November 9, 2001

Please show *all* of your work. In certain problems, you may be asked to use Design Works. 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 Design Works).

1. Katz 4.2, p.231 (PAL). See Chapter 4.5, p. 212ff.
2. Create a DesignWorks project for a binary full-adder. Be sure and save your finished project since you may need to use it again on a later assignment. You can find a block diagram, a truth table, and a schematic diagram for a full adder on Katz pgs.14, 19, and 250, respectively. Perform the following:
 - a) Draw the full-adder schematic in DesignWorks, using standard logic gates from the PrimGate library. Label A , B , and C_{in} as inputs; Sum and $Cout$ as outputs. Use "port in" and "port out" symbols from the Pseudo library to label your inputs and outputs. Turn in your schematic drawing.
 - b) Create a block symbol for your full adder (as on pg. 14 of Katz). Label the symbol "FullAdder". Create a new schematic and test your adder with the "binary probe" and hex keypad method as described in question **Error! Reference source not found.**. Turn in this schematic showing the probe and keypad.
 - c) Draw a schematic where you cascade four full-adders (four of your blocks from part (b)) as in Fig. 6 on pg. 249 of Katz. Label the inputs $A_0, A_1, A_2, A_3, B_0, B_1, B_2, B_3$; label the outputs S_0, S_1, S_2, S_3 , and C_4 . Attach five "binary probes" from the Primio library to the four Sum digits and to $Cout$. Connect C_{in} for the first adder to logic "0". Attach two "hex keyboards" from the Primio library to your A and B inputs. Verify that your adder computes the sums $A+B$ correctly, where
 - i) $A=0$ and $B=3$
 - ii) $A=7$ and $B=7$
 - iii) $A=9$ and $B=7$

Turn in three schematic sheets, showing the correct outputs for these three cases on the binary probes.