CpE 318, Section A: Design Project #2

(due Thursday, May 6)

* This project will be done with the same group as for Project #1. No collaboration between groups is permitted. Identical or nearly identical solutions will receive NO CREDIT for either group (at my discretion).

Problem: Testing the Huffman Encoder Chip:

Write a testbench which reads characters from a file of characters called "huff_in.dat" to be used as the character inputs to the Huffman Encoder Chip. This testbench should then write two text files and a file of characters:

1) "huff_codes.dat" is a text file that stores each character and corresponding Huffman code, one per line, as the 7-bit representation of the ASCII character followed by its Huffman code (i.e. for 'G': "`1000111 0010`").
2) "huff_out.dat" is a text file that stores the Huffman encoded text file, consisting of 25 8-bit hexadecimal values, separated by 1 space, per line (i.e. `4F 56 AC …`). 0^s should be appended to the last value, if necessary, such that it is always an 8-bit hexadecimal number.
3) "huff_decode.dat" is a file of characters that stores the decoded version of the Huffman encoded text file, "huff_out.dat" (this should be the same as "huff_in.dat").

The testbench should then compare the original file ("huff_in.dat") with the decoded file ("huff_decode.dat") to ensure that the encode/decode process was successful.

Steps:

1) provide the character inputs (from "huff_in.dat") and handshaking signals to the Huffman Encoder Chip.
2) store the Huffman character encoding chip output in "huff_codes.dat".
3) store the Huffman encoded file chip output in "huff_out.dat".
4) decode "huff_out.dat" and store the decoded file in "huff_decode.dat".
5) compare "huff_decode.dat" with "huff_in.dat" and assert an internal testbench signal, *incorrect*, if the two files are not exactly the same.

* These steps much be done sequentially in the order listed above.

Turn in a report containing the following:

1) the VHDL code for your testbench (also email to: smithsco@umr.edu)
2) your simulation macro (also email to: smithsco@umr.edu)
3) the file "huff_in.dat" (also email to: smithsco@umr.edu)
4) a description of how your testbench works

* be especially careful that the file names, and case, are exactly the same as what is shown above for your testbench.