Exam 1

Wednesday, October 2, 2002.

Problem 1 - 8 are 5 points each.

1. Secondary memory is volatile.
   (a) True
   (b) False

2. A file is a sequence of bytes.
   (a) True
   (b) False

3. A nibble is 6 bits.
   (a) True
   (b) False

4. An algorithm can have an infinite loop.
   (a) True
   (b) False

5. Is the following a valid algorithm for washing hair instruction?
   1. Lather.
   2. Rinse.
   3. Repeat.

   (a) True
   (b) False

6. Which of the following is often described as the “brain” of the computer?
   (a) Central Processing Unit (CPU)
   (b) Memory Unit
   (c) Input/Output (I/O) Unit
   (d) Arithmetic and Logic (ALU) Unit
7. If the memory has 32 words, how many bits does an address bus need to carry at a time?

   (a) 1 bit
   (b) 32 bits
   (c) 5 bits
   (d) None of the above.

8. How many times does the following loops display Hi.?

   x = 6
   While (x > 0)
       Display Hi.
       Decrement x by 2
   End_While

   (a) 4
   (b) 6
   (c) 3
   (d) None of the above.
9. (20 points) Show how you derived your answers. Answer three out of five questions below:

(a) Convert the decimal number 66 to binary number.
(b) Convert the binary number 10101 to decimal number.
(c) Convert the decimal number 77 to hexadecimal number.
(d) Convert the hexadecimal A6F number to decimal number.
(e) Write the hexadecimal equivalent of 1110111
10. (20 points) Assuming we have 4 projects and 2 exams for the CMSC104 class. Our grading methods are as follows:

- Projects: 60%
- Exams: 40%

Write a pseudocode to compute a student’s final grade for CMSC104. You are not required to check that the inputs are valid. Your pseudocode need to output student’s name and final grade.

Your pseudocode should be clearly written, documented with comment lines, and included 4 steps that we discussed in the class in order to get full credit.
11. (20 points) Give an algorithm to display an outline of right triangle whose height and width are both equal to an integer length $L$, where $L \geq 2$. See figure below for an example of $L = 5$.

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******
 *   *
 *   *
 ** *
 * *
 * 
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12. (Extra Credit Problem: 10 points)
   Given a real number x, ceiling of x, denoted \(\lceil x \rceil\), is the smallest integer that is greater than or equal to x. For example, \(\sqrt{6} = 2.4495\), and \(\lceil 2.4495 \rceil = 3\).

   Give an algorithm which inputs an integer \(x\), where \(x \geq 0\), computes and outputs \(\lceil \sqrt{x} \rceil\).
   Your algorithm does not need to be efficient, but it is not allowed to call the system’s build-in SQRT function.
   Hint: Use the similar technique that we discussed for the \(\lfloor \sqrt{x} \rfloor\) in the class.