Due: Friday, 7 February

Submission: Turn in a printed or neatly written copy of your work at the beginning of class.

Collaboration: Each student must work on and submit their assignment individually.

1. Convert each of the following positive integers (in binary notation) to the equivalent base ten (decimal) representation. Show your work.
   (a) 101011
   (b) 110110

2. Convert each of the following integers (in decimal notation) to the equivalent binary representation. Show your work. Left-leading zeros may be omitted.
   (a) 21
   (b) 68

3. Perform the following binary addition, showing your work and giving the result in binary notation.

   \[
   \begin{array}{c}
   \hspace{1cm} 1010111 \\
   + \hspace{1cm} 0010111 \\
   \hline
   \end{array}
   \]

4. Perform the following binary multiplication, showing your work and giving the result in binary notation.

   \[
   \begin{array}{c}
   \hspace{1cm} 011 \\
   \times \hspace{1cm} 110 \\
   \hline
   \end{array}
   \]

5. Write a brief message, encoded in ASCII (i.e., each character in the message should be given by the decimal representation of the associated ASCII character code). Your message should be meaningful (as opposed to random characters), and it should include both an upper- and lower-case letter, punctuation, and either a numeric digit or other symbol. One place you can find the ASCII table is http://en.wikipedia.org/wiki/ASCII#ASCII_printable_characters

   Here is an example (with a little bonus):

   \[
   \begin{array}{ccccccc}
   84 & 119 & 101 & 101 & 116 & 33 & 7 \\
   \end{array}
   \]

6. Give a Linux shell command (or series of commands) that changes the permissions of your current directory so that you, the group, and everyone else can read a file they have permission to read in the directory, but prevents anyone (including yourself) from getting a listing of the directory.

   Report the resulting permissions for the directory (i.e., rwxr--r--, the triple-of-triples format you learned in Exercise 9 of the “Getting Started with Linux” lab).

   For example, if directory 1ab2 had such permissions you might see the following:

   \[
   \begin{array}{c}
   \$ \text{cd lab2} \\
   \$ \text{ls} \\
   \text{ls: cannot open directory .: Permission denied} \\
   \$ \text{cat ./message.txt} \\
   \text{Hello, world!} \\
   \end{array}
   \]

Note: This exercise may require some experimentation. I strongly suggest you use your 1ab2 directory or some other temporary directory. Do not change the permissions on your home directory, which is typically your default working directory; you may inadvertently give others permission to read (or worse, write) to all your MathLAN files.