Instructions: This is the first homework for CS170 (Section 001). Unlike labs, you are expected to do homeworks on your own. Future homeworks will involve programming, but this first one is mostly written, and you should turn it in on paper.

Honor Code: Like all work for this class, the Emory Honor Code applies. You should do your own work on all problems, unless you are explicitly instructed otherwise. If you get stuck or have questions, ask your instructor or a TA for help.

Initial here to indicate that you followed the Honor Code and this work is your own. __________

1. Binary Numbers. (40 pts)
   1.1 Convert the following binary numbers into their decimal equivalents. Show all your work. (15 pts)
   
   1) \((11)_2\)

   2) \((10110)_2\)

   3) \((1111111)_2\)

   1.2 Convert the following decimal numbers into their binary equivalents. Show all your work. (10 pts)
   1) \((11)_{10}\)
2. Answer the following question. (30 pts)

1) What’s a compiler in computer science?

2) What’s the difference between register and RAM?

3) What’s the relationship between CPU and RAM?

4) How many bits are in 3 KB? Show all your work.

5) How many bytes are in 5 MB? Show all your work.
6) How many bytes are required to encode numbers from \((10)_{10}\) to \((1000)_{10}\)? Show all your work.

3. The ASCII is one of the most popular character-encoding schemes used in modern computers. You can find the encoding table on http://www.asciitable.com/. Using the ASCII encoding scheme, convert the encoded message in ASCII to the original message (20 pts).

87 101 108 99 111 109 101 32 116 111 32 67 83 49 55 48 33

4. Describe an algorithm to swap the values of two numbers A and B. (10 pts)
(Hint. You can use additional storages other than A and B)