

CS1356 Introduction to Information Engineering

Homework 1

Due: Oct 7, 2009 in class

Please remember to write your name and student ID

1. Write **three** questions you want to know about computer science/computer engineering? Or questions about Chapter 1 of the textbook. (15%)
2. For the following questions, use your own student ID. (If you use a number or a string other than your student ID, you will get ZERO.) (50%)
 - (a) Write down the ASCII code of each digit in decimal. For example, if your student ID is "007", then the answer is "48 48 55", because the ASCII code for "0" is 48, and for "7" is 55. You can find the ASCII code table in the appendix A of textbook.
 - (b) Write down the **last four digits** of your student ID and treat it as a number. What is the binary number representation of this number? Please use as less bits as possible.
 - (c) Write down the two's complement of the answer in (b) in the 13 bits number system. The zero in the 13 bits number system is 0000000000000.
 - (d) Express the answer in (b) using the floating number representation. Suppose 1 bit for the sign, 5 bits for the exponent in the excess notation system (from -16 to 15), and 10 bits for the mantissa. The mantissa need be normalized so that it is less than 1 and larger than or equal to $\frac{1}{2}$. Do the direct truncation for the mantissa.
 - (e) What is the truncation error of your answer in (d)? What is the truncation error if you only use 4 bits for the mantissa?
3. Suppose there is a **ternary number system** (base-3 number system) in which each digit can only be 0, 1, 2. For example, 210 in the ternary number system is $2*3^2+1*3^1+0*3^0 = 21$ in the decimal number system. (35%)
 - (a) How many different numbers can be represented by a 5 digits ternary number system?
 - (b) Extend the idea of the two's complement for defining the negative numbers in the binary number system to the ternary number system. What should be the negative number of the ternary 0210 using the complement idea in the four digits ternary system?
 - (c) Can you think an application that might be beneficial to use the ternary number system?