EECS 213: Homework 1

Integer and Floating Point Number Representations

Spring 2007

Important Dates

Out: 3/28/07

Due: 04/09/07 11:59

Submitting your homework: Please use the course submission site. There is a link to it from the class site. **Submit only ASCII text files.**

To be done individually.

Integer - Problems

- 1. Textbook problem 2.44
- 2. Textbook problem 2.48
- 3. Write a small piece of C code that can determine how many bits there are in an unsigned long int on any machine.
- 4. Textbook problem 2.54 (B, C, D, E)

Floating Point - Problems

Consider the two small floating point formats in Fig. 1 based on the IEEE standard. Except for the sizes of these formats, the rules are those of the IEEE standard.

- 1. For both formats, determine the following values (in decimal)
 - (a) Largest positive finite number
 - (b) Positive normalized number closest to zero
 - (c) Largest positive denormalized number
 - (d) Positive denormalized number closest to zero



Tiny Format



Sign Bit Exponent (bias is 3) Significand (Mantissa)

Figure 1: Little and Tiny Formats.

- 2. Encode the following values in the 8 bit Little Format: 3/4, -13/16, 44, and -104, show each in binary and hexadecimal.
- 3. Determine the values corresponding to the following Little Format bit patterns. The leftmost bit is the most significant.
 - (a) 10110011
 - (b) 01111010
 - (c) 10010001
 - (d) 01001111
 - (e) 11000001
- 4. Convert the following 8 bit Little Format numbers into 6 bit Tiny Format numbers. Overflow should yield +/- infinity, underflow should yield +/- 0.0, and rounding should follow the "round-to-nearest-even" tie-breaking rule.
 - (a) 00010000
 - (b) 11101000
 - (c) 00110011
 - (d) 11001110
 - (e) 11000101