**Concordia University**
**Dept. of Computer Science and Software Engineering**
**COMP 228/1 AA - System Hardware**
**Summer 2012**

**Practice Problems 1:**

**Question 1**.

Represent the decimal values 26, -37, and -123 as signed, 10-bit binary numbers in the following formats:

(a) sign and magnitude (b) 2's complement

**Question 2**.

Consider the binary numbers in the following addition and subtraction problems to be signed, 6-bit values in **2's complement representation**. Perform the operations indicated, specify whether overflow occurs, and check your answer by converting operands and results to decimal representation:

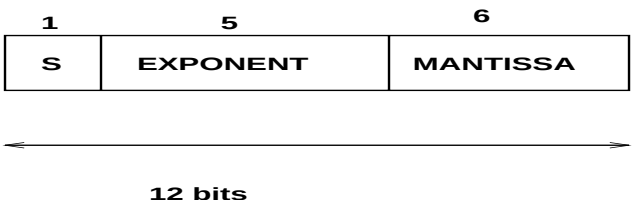
(i) 010110
+ 001001

(ii) 011001
+ 010000

(iii) 010110
- 011111

**Question 3**.

Consider the following **floating-point representation** used to represent real numbers. The 6-bit mantissa is normalized as in the **IEEE format**, with an **IMPLIED 1** to the left of the binary format. The **base** is two. The 5-bit exponent is stored using **excess-15** notation, with the two end values of **0** and **31** used to signify exact **0** and **infinity**, respectively. :




(a) Represent the numbers +1.7, -0.012, and +19 in this format.
(b) What are the smallest and largest positive numbers representable in this format?