

CMSI 284 Assignment 0204 Numeric Encoding

The Author

January 27, 2010

1. Assuming a 16-bit storage word, complete the following table:

Unsigned Decimal	Signed Decimal	Hexadecimal	Binary
	-992		
		ABCD	
		1101	
			0100100111010111
		9009	
60324			
42			
	-42		
	-8		
			0000110110111110
		B0DA	

2. Assume 16-bit signed words $x = 9000$, $y = \text{AA0B}$, $z = 3421$, $w = 00\text{EF}$. Compute:

$$\begin{aligned}
 -x &= ? \\
 -y &= ? \\
 -z &= ? \\
 -w &= ?
 \end{aligned}$$

3. Do the following 16-bit sums, assuming *signed* arithmetic, for both saturated and modular addition. Indicate for each whether the modular arithmetic produced a carry and/or an overflow.

	Saturated	Modular	Carry?	Overflow?
3127 + ACDC				
10AB + 239C				
FFFF + 0002				
9182 + F00D				
BAAA + 302E				

4. Complete the following equivalences:

- 2048 bytes = ? kibibytes
 1048576 bytes = ? mebibytes
 64 kibibytes = ? bytes
 512 kibibytes = ? mebibytes
 2^{32} bytes = ? gibibytes

5. Assuming IEEE 754 single precision, complete the following table. Express decimal values as accurately as you can. If it is necessary to use scientific notation, do so with powers of two.

Comment	Hex	Decimal
largest finite positive		
smallest nonzero negative		
largest nonzero negative		
smallest finite negative		$-(2 - 2^{-23}) \times 2^{127}$
—	00000000	
—	C0000000	
—	42280000	
—	FE000000	
—		2^{-120}
—		1.25×2^{80}
—		16777216
—		negative infinity