

**CMSC 240 – Principles of Computer Organization
Spring 2024**

Solutions to Homework#1

2.4 2^n integers can be represented. The range would be 0 to $(2^n) - 1$.

2.6 100000

2.9 Avogadro's number (6.02×10^{23}) requires 80 bits to be represented in two's complement binary representation.

2.10 The answers are:

- (a) -6
- (b) 90
- (c) -2
- (d) 14803

- 2.11** (a) 01100110
(b) 01000000
(c) 00100001
(d) 10000000
(e) 01111111

- 2.14** (a) 1100
(b) 1010
(c) 1111
(d) 01011
(e) 10000

- 2.20** (a) $1100 + 0011 = 1111$
 $-4 + 3 = -1$
- (b) $1100 + 0100 = 0000$
 $-4 + 4 = 0$
- (c) $0111 + 0001 = 1000$ OVERFLOW!
 $7 + 1 = -8$
- (d) $1000 - 0001 = 1000 + 1111 = 0111$ OVERFLOW!
 $-8 - 1 = -8 + (-1) = 7$
- (e) $0111 + 1001 = 0000$
 $7 + -7 = 0$

- 2.30** (a) 01010111
(b) 100
(c) 10100000
(d) 00010100
(e) 0000
(f) 0000

- 2.39** (a) 0 10000000 111000000000000000000000
(b) 1 10000100 101110101110000000000000
(c) 0 10000000 10010010000111111011011
(d) 0 10001110 111101000000000000000000

- 2.40** (a) 2
(b) -17
(c) Positive infinity.
(d) -3.125