Solution to homework 2 and 3

2.1 The answer is 2^n
2.2 For 26 characters, we need at least 5 bits. For 52 characters, we need at least 6 bits.

2.6 100000.
2.7 Refer the following table:

0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	-8
1001	-7
1010	-6
1011	-5
1100	-4
1101	-3
1110	-2
1111	-1

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

2.13 (a) 11111010
(b) 00011001
(c) 11111000
(d) 00000001

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

2.15 Dividing the number by two.

2.16 (a) 11111111 (binary) or -0 (decimal)
(b) 10001110 (binary) or -14(decimal)
(c) 00000000 (binary) or 0 (decimal)

2.17 (a) 1100 (binary) or -4 (decimal)
(b) 01010100 (binary) or 84 (decimal)
(c) 0011 (binary) or 3 (decimal)
(d) 11 (binary) or -1 (decimal)

2.18 The answers are:
(a) 1100 (binary) or 12 (decimal)

(b) 1011000 (binary) or 88 (decimal)
(c) 1011 (binary) or 11 (decimal)
(d) 11 (binary) or 3 (decimal)

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

2.27 The problem here is that over_ow has occurred as adding 2 positive numbers has resulted in
a negative number.

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

2.33 (a) 11010111
(b) 111
(c) 11110100
(d) 10111111
(e) 1101
(f) 1101

2.34 (a) 0111
(b) 0111
(c) 1101
(d) 0110

2.39 (a) 0 10000000 11100000000000000000000
(b) 1 10000100 10111010111000000000000
(c) 0 10000000 10010010000111111011011
(d) 0 10001110 11110100000000000000000

2.40 (a) 2
(b) -17
(c) Positive in_nity. NOTE: This was not explained in the text.
(d) -3.125

2.43 (a) Hello!
(b) hELLO!
(c) Computers!
(d) LC-2

2.45 (a) xD1AF
(b) x1F
(c) x1
(d) xEDB2

2.46 (a) 0001 0000
(b) 1000 0000 0001
(c) 1111 0111 0011 0001
(d) 0000 1111 0001 1110 0010 1101
(e) 1011 1100 1010 1101

2.49 (a) x2939
(b) x6E36
(c) x46F4
(d) xF1A8
(e) The results must be wrong. In (3), the sum of two negative numbers produced a positive result. In (4), the sum of two positive numbers produced a negative result. We call such additions OVERFLOW.

2.50 (a) x5468
(b) xBBFD
(c) xFFFF
(d) x32A3