COMP2120B Computer organization

Assignment 2 Solution

Question 1

a) 37: 00100101 -37: 11011011 45: 00101101 -45: 11010011

b) (i)

		0	0	1	0	0	1	0	1	37
	+	0	0	1	0	1	1	0	1	45
	=	0	1	0	1	0	0	1	0	82
/:: \										•

(ii)

		0	0	1	0	0	1	0	1	37
_	+	1	1	0	1	0	0	1	1	-45
•	=	1	1	1	1	1	0	0	0	-8

(iii)

			1	1	0	1	1	0	1	1	-37
	+		0	0	1	0	1	1	0	1	45
_	=	1	0	0	0	0	1	0	0	0	8

(iv)

			1	1	0	1	1	0	1	1	-37
_	+		1	1	0	1	0	0	1	1	-45
	=	1	1	0	1	0	1	1	1	0	-82

c) 0010.0101: 2.3125 1101.1011: -2.3125 0010.1101: 2.8125 1101.0011: -2.8125

Question 2

$$S = 1$$
 $E = 1 0000 0111_2 = 263_{10}$

 $E = 1\,0000\,0111_2 = 263_{10}$ $M = 01\,1101\,1100\,1100\,1100\,1101$

$$V = -1 \times 1.0111011100110011001101101_2 \times 2^{263-256} = -187.600006103515625$$

b) $2120.25 = 100001001000.01 = 1.0000100100001_2 \times 2^{11} = 1.0000100100001_2 \times 2^{267 - 256}$

$$S = 0$$
 $E = 267_{10} = 100001011_2$

M = 00 0010 0100 0010 0000 0000

Therefore, the bit pattern is **42c24200**.

c) Largest positive number that can be represented should have the maximum value for E and M.

$$S = 0$$
 $E = 1 1111 1111_2 = 511_{10}$

d) Smallest positive normal nonzero that can be represented should have a value of 0 for both E and M.

$$S = 0$$
 $E = 0 0000 0000_2 = 0_{10}$