

Assignment 1 Data representation

Student name: Hai Hoang Le

Starting point is number 2

Task 1

a) 675

$$675 / 16 = 42 \text{ remainder } 3$$

$$42 / 16 = 2 \text{ remainder } 3$$

$$2 / 16 = 0 \text{ remainder } 2$$

Answer: 0x233

b) -78

78 in binary: 0b 0100 1110

Flip all the bits: 0b 1011 0001

-78 in 8 bit two's complement 0b 1011 0010

Answer: 0b 1011 0010

c) 114.5

Positive number, Sign = 0

Integer 114 = 0b 0111 0010

Fraction = 0.5

$$0.5 \times 2 = 1.0$$

$$0 \times 2 = 0$$

M = 0.100000000000000000

Answer: 0 1011 0010 100000000000000000

Task 2

Starting point 2: 0101 0111 1010 0110

a) Hexadecimal value:

0101 = 5

0111 = 7

1010 = 10 or A in hexadecimal

0110 = 6

Answer: 0x 57A6

b) Two 8 bit unsigned integer as decimal values:

0101 0111 = $1 \times 2^0 + 1 \times 2^1 + 1 \times 2^2 + 1 \times 2^4 + 1 \times 2^6 = 87$

1010 0110 = $1 \times 2^1 + 1 \times 2^2 + 1 \times 2^5 + 1 \times 2^7 = 166$

c) Two 8 bit signed integer as decimal values:

0b 0101 0111

Subtract 1 = 0101 0110

Flip: 1010 1001

Answer: 1010 1001

0b 1010 0110

Subtract 1 = 1010 0101

Flip = 0101 1010

Answer: 0101 1010

d) 0101 0111 1010 0110
0 10101111 010 0110

Sign = 0 so this is a positive number

Exp = 0b 10101111 – 15 = 160

M = 1.0100110 = $2^0 + 2^{-2} + 2^{-5} + 2^{-6} = 1.296875$

Number = $(-1)^s \times M \times 2^{\text{Exp}} = (-1)^0 \times 1.296875 \times 2^{160} = 1.89538 \times 10^{48}$

Answer: 1.89538×10^{48}

Task 3

We have: c2 b9 f0 9d 9f ba 39 e2 a0 a1

Transfer to binary:

c2 = 1100 0010

b9 = 1011 1001

f0 = 1111 0000

9d = 1001 1101

9f = 1001 1111

ba = 1011 1010

39 = 0011 1001

e2 = 1110 0010

a0 = 1010 0000

a1 = 1010 0001

Utf8 is

c2 = 1100 0010

b9 = 1011 1001

=>00010111001

f0 = 1111 0000

9d = 1001 1101

9f = 1001 1111

ba = 1011 1010

=>000011101011111111010

39 = 0011 1001

=>0111001

e2 = 1110 0010

a0 = 1010 0000

a1 = 1010 0001

=>0010100000100001

Unicode:

U+00B9 U+01D7FA U+0039 U+2821

The word is '49 '.

