

## Quiz 1

**Q1.** Suppose we are using 13-bit floating-point representation where there is 1 sign-bit and 4 exponent bits. What is  $(48.75)_{10}$  in this floating-point representation?

- A. 0.1100 0011 [1110]
- B. 0.1100 0010 [0110]
- C. 0.1100 0011 [0110]
- D. None of the answers.

**Solution:**

$$(48)_{10} = (11\ 0000)_2$$

$$(0.75)_{10} = (0.11)_2$$

$$(48.75)_{10} = (11\ 0000.11)_2$$

1 sign-bit  $(0)_2$ , 8 mantissa bits  $(1100\ 0011)_2$ ,

Shift radix point left for 6 places,  $6 = 2^2 + 2^1$ , 4 exponent bits  $(0110)_2$ .

So, the answer is 0.1100 0011 [0110].

**Q2.** What would the 2's complement  $(1010\ 1010)_2$  be as a decimal number?

- A. -85
- B. -86
- C. 170
- D. None of the answers.

**Solution:**

$$-2^7 + 2^5 + 2^3 + 2^1 = -128 + 32 + 8 + 2 = -86$$

**Q3.** What would the hexadecimal  $(3E)_{16}$  be as 1's complement?

- A. 0111 1110
- B. 0011 1110
- C. 1100 0001
- D. None of the answers.

**Solution:**

$(3E)_{16}$  is a positive number, so just write its binary form  $(0011\ 1110)_2$ .

**Q4.** Unsigned binary numbers addition: What would  $(1010\ 0101)_2 + (0100\ 0100)_2$  be as a binary number?

- A. 1110 1001
- B. 0110 1001
- C. 1110 1011
- D. None of the answers.

**Solution:**

$$\begin{array}{r} 1010\ 0101 \\ +\ 0100\ 0100 \\ \hline 1110\ 1001 \end{array}$$

**Q5.** Simplify the following rational expression and express in expanded form.

$$\frac{16x^2 - y^2}{20x + 5y}$$

- A.  $\frac{4x-y}{5}$
- B.  $\frac{4x+y}{5}$
- C.  $\frac{5x-y}{4}$
- D. None of the answers.

**Solution:**

$$\frac{16x^2 - y^2}{20x + 5y} = \frac{(4x + y)(4x - y)}{5(4x + y)} = \frac{4x - y}{5}$$

**Q6.** Binary subtraction:  $(1010.11)_2 - (1001.01)_2 = ?$

- A. 0001.10
- B. 0010.01
- C. 1 0010.01
- D. 1 0001.10

**Solution:**

The 2's complement of  $(1001.01)_2$  is  $(0110.11)_2$ .

So,  $(1010.11)_2 - (1001.01)_2 = (1010.11)_2 + (0110.11)_2$

	1010.11		10.75
+	0110.11	-	9.25
	<hr/>		<hr/>
1	0001.10		1.5

The answer of  $(1010.11)_2 - (1001.01)_2 = (0001.10)_2$