IN1006 Systems Architecture (PRD1 A 2022/23)

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Grade	**10.00** out of 10.00 (**100**%)

Which of the following binary numbers corresponds to the result of the following subtraction of hexadecimal numbers (hint: transform the hexadecimal numbers to binary and perform subtraction as addition of the 2's complement the number to be subtracted):

62$_{hex}$ - 39$_{hex}$

- a. 0011 1001
- b. 1010 1010
- c. 0000 1111
- d. 0010 1001   ✔ Correct answer.
- e. 0111 0000

Your answer is correct.

The binary form of 62$_{hex}$ is: 0110 0010

The binary form of 39$_{hex}$ is: 0011 1001

Subtracting 39$_{hex}$ from 62$_{hex}$ can be carried out by adding the 2's complement of 39$_{hex}$ to 62$_{hex}$.

To find the 2's complement of 39$_{hex}$ we first flip the bits of its binary representation. This gives us: 1100 0110   (flip bits)

And then we add 1, so we get:

1100 0110

+   1

This gives us:

1100 0111 (i.e., the 2's complement of 39$_{hex}$)

Then we perform the addition:

   0110 0010 (62$_{hex}$)

+ 1100 0111 (i.e., the 2's complement of 39$_{hex}$)

The result of this addition is

0011 1101

and as the left most bit is 0 the number is a positive one and therefore it constitutes the answer.

The correct answer is:
0010 1001

Which of the following numbers is the octal number representing number 20 in the decimal system (select one answer)?

- a. 16
- b. 10
- c. 24   ✔ Correct.
- d. 44
- e. 66

Your answer is correct.

The correct answer is:
24

Question **3**
Correct
Mark 1.00 out of 1.00

What are the binary and decimal representations of the hexadecimal number F4?

Select one:
- a. Binary: 11110100   Decimal: 240
- b. Don't know/No answer
- c. Binary: 11110100   Decimal: 244   ✔
- d. Binary: 11100100   Decimal: 244
- e. Binary: 11110010   Decimal: 244

Your answer is correct.

To convert from base 16, we remember that $F4_h$ means

F x 16^1 + 4 x 16^0

15 x 16 + 4 x 1

240 + 4

244_{10}

The correct answer is: Binary: 11110100   Decimal: 244

What is the correct result of the operation below? The initial numbers should be considered as unsigned integers. The result should be given in 2's complement. (Hint: use 2's complement arithmetic to perform the operation.)

00010101 - 00001111

Select one:

- a. Don't know/no answer
- b. 00000110 ✔
- c. 11111010
- d. 00011001
- e. 10100101
- f. 11101010

To perform the subtraction we find the negative of the subtrahend:

00001111 (subtrahend)

11110000   (1's complement, flip one bit)

00000001 (add 1)

11110001 (2's complement of the subtrahend)

perform the addition:

00010101

11110001 +

00000110 (this is the result in 2's complement or 6 in decimal) (no overflow has occurred because the carry in equals the carry out of the sign bit)

The correct answer is: 00000110

What are the binary and decimal representations of the hexadecimal number F4?

Select one:

- a. Binary: 11110100   Decimal: 244 ✔
- b. Binary: 11110100   Decimal: 240
- c. Binary: 11100100   Decimal: 244
- d. Binary: 11110010   Decimal: 244
- e. Don't know/No answer

Your answer is correct.

To convert from base 16, we remember that $F4_h$ means

F x 16^1 + 4 x 16^0

15 x 16 + 4 x 1

240 + 4

244_{10}

The correct answer is: Binary: 11110100   Decimal: 244

Question **6**

Correct

Mark 1.00 out of 1.00

What is the numeric range of an 8-bit signed magnitude binary number?

Select one:

- a. 0...255
- b. -255...256
- c. Don't know/no answer
- d. 0...7
- e. -127...127 ✔
- f. -128 ... 127

We represent the negative values in the range -127 through -1 and the positive values in the range 0 through 127 with a single 8-bit byte.

The correct answer is: -127...127

Mark 1.00 out of 1.00

What is the numeric range of an 4-bit signed magnitude binary number?

Select one:
- a.   -255...256
- b.   0...7
- c.   0...255
- d.   -128 ... 127
- e.   None of the listed options.   ✔
- f.   -127...127

Your answer is correct.

The correct answer is: None of the listed options.

Question **8**

Correct

Mark 1.00 out of 1.00

What is the numeric range of an 8-bit binary number in 2's complement arithmetic?

Select one:
- a.   0...255
- b.   -127 ... 127
- c.   Don't know/no answer
- d.   -128 ...127   ✔
- e.   0...7
- f.   -128 ... 128

We represent the negative values in the range -128 through -1 and the positive values in the range 0 through 127 with a single 8-bit byte, so -128 ... 127.

The correct answer is: -128 ...127

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