CONVERTING FROM DECIMAL TO BINARY AND BINARY TO DECIMAL

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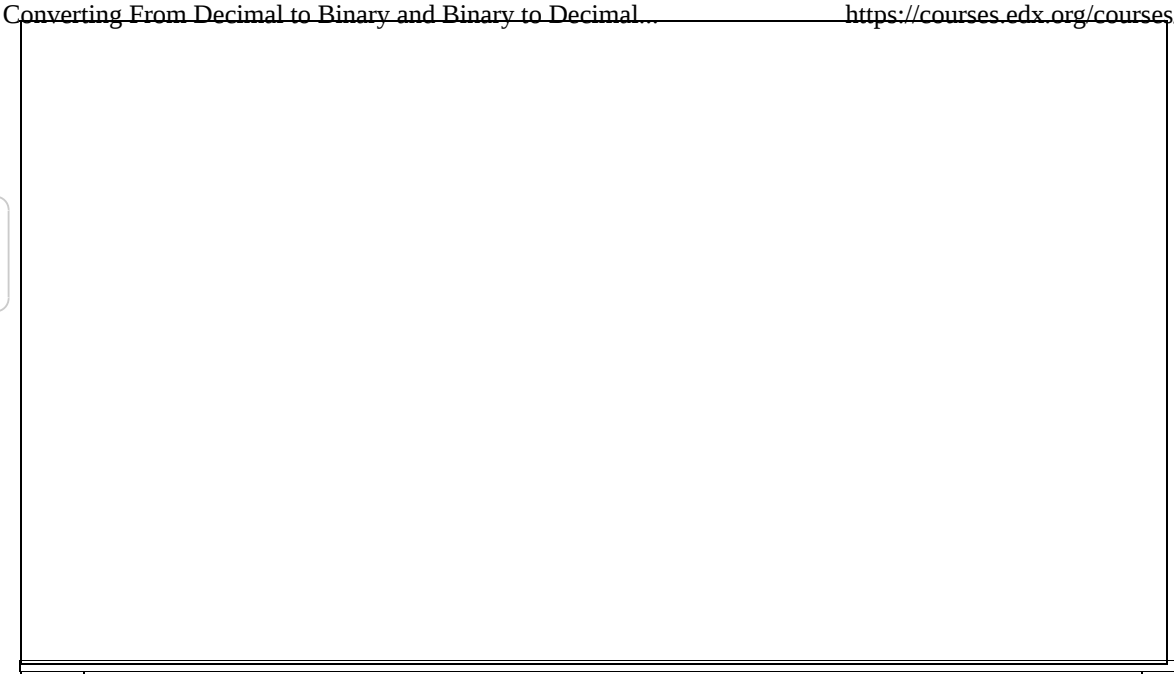
HEXADECIMAL NOTATION

Help



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Professor Albonesi described how we can write binary (base 2) numbers as hexadecimal (base 16) numbers, using the chart below:

Binary	Hex	Decimal		Binary	Hex	Decimal
0000	0	0		1000	8	8
0001	1	1		1001	9	9
0010	2	2		1010	A	10
0011	3	3		1011	B	11
0100	4	4		1100	C	12
0101	5	5		1101	D	13
0110	6	6		1110	E	14
0111	7	7		1111	F	15

Using this chart, we can now convert binary numbers to hexadecimal numbers. Looking at a string of binary numbers, each group of four numbers becomes a hexadecimal digit. Take the following example:

00111010100011111010011010111

Starting from the right-hand side, group these numbers into blocks of four.

0011	1010	1000	1111	0100	1101	0111

Once they are grouped, you can consult the chart above and assign the proper hexadecimal number for each group of 4 binary numbers.

0011	1010	1000	1111	0100	1101	0111
↓	↓	↓	↓	↓	↓	↓
3	**A**	**8**	**F**	**4**	**D**	**7**

Thus, this long string of binary digits can be written in hexadecimal notation as 3A8F4D7.

Remember that this hexadecimal notation is not a new machine representation. It is merely a convenient way to write the number.

Help

1. CHECK YOUR UNDERSTANDING (1/1 point)

What is the two's complement value of the decimal number 137?

- 10001001
- 10010001
- 010010001
- 010001001 ✔

EXPLANATION

Using first method:

137/2 = 68 r1 bit 0

68/2 = 34 r0 bit 1

34/2 = 17 r0 bit 2

17/2 = 8 r1 bit 3

8/2 = 4 r0 bit 4

4/2 = 2 r0 bit 5

2/2 = 1 r0 bit 6

1/2 = 0 r1 bit 7

Append a 0 to the MSB since it's positive: 010001001

Final Check | **Save** | Hide Answer | *You have used 1 of 2 submissions*

2. CHECK YOUR UNDERSTANDING (1/1 point)

What is the two's complement value of the decimal number -67?

- 01000011
- 01111101
- 10111100
- 10111101 ✔

EXPLANATION

Start with positive 67. Using second method:

67 – 64 = 3 bit 6

3 – 2 = 1 bit 1

1 – 1 = 0 bit 0

Append a 0 to the MSB since we are using a positive number:

01000011

Convert to two's complement:

10111101

Help

Final Check | **Save** | **Hide Answer** *You have used 1 of 2 submissions*

3. CHECK YOUR UNDERSTANDING (1/1 point)

Convert the hexadecimal number ABC to unsigned binary.

- 010101000011
- 101010111100 ✔
- 101011001101
- 110011001011

EXPLANATION

A = 1010, B = 1011, C = 1100

Number is 101010111100.

Final Check | **Save** | **Hide Answer** *You have used 1 of 2 submissions*

4. CHECK YOUR UNDERSTANDING (1/1 point)

Convert the binary number 0100000001 to hexadecimal.

- 101 ✔
- 200
- 201
- 204

EXPLANATION

01 0000 0001
1 0 1

Final Check | Save | Hide Answer | *You have used 1 of 2 submissions*

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