

Base 10
Decimal
10 digits 0 through 9

Base 2
Binary (0,1)
0 1
2 digits 0 and 1

0

1

2

3

4

5

6

7

8

9

10

10

10^1 10^0

10 | positional value

Dec		Bin	100
0		0	
1		1	<u>1</u> <u>0</u> <u>0</u> face value
2	_____	10	2³ 2 ² 2 ¹ 2 ⁰ 2 to the third power
3		11	8 4 2 1 positional value
4	1 x 4 = 4		
5	0 x 2 = 0	face 100	
6	0 x 1 = 0	0 x 1 = 0	
7	_____	1 x 2 = 2	
8	4	2	
9			
10			

			1
			1
			+ 1
			<u>10</u>

	Dec	Bin					
	0	0					
	1	1					
111	2	10	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
421	3	11	16	8	4	2	1
	4	100					
	5	101					
	6	110					
	7	111					
	8	1000					
	9	1001					
	10	1010					

Base 10 uses powers of 10 for positional values.
 Base 2 uses powers of 2 for positional values.

$$\overline{10^3} \quad \overline{10^2} \quad \overline{10^1} \quad \overline{10^0}$$

$$\begin{array}{r} \underline{1} \quad \underline{0} \quad \underline{0} \quad \underline{1} \quad \underline{0} \quad \underline{0} \quad \underline{1} \\ 2^6 \quad 2^5 \quad 2^4 \quad 2^3 \quad 2^2 \quad 2^1 \quad 2^0 \\ 64 \quad 32 \quad 16 \quad 8 \quad 4 \quad 2 \quad 1 \end{array} = \underline{73}$$

$$\begin{array}{r} \underline{1} \quad \underline{0} \quad \underline{1} \quad \underline{1} \quad \underline{1} \quad \underline{1} \quad \underline{0} \\ 2^7 \quad 2^6 \quad 2^5 \quad 2^4 \quad 2^3 \quad 2^2 \quad 2^1 \quad 2^0 \\ 128 \quad 64 \quad 32 \quad 16 \quad 8 \quad 4 \quad 2 \quad 1 \end{array} \quad \begin{array}{r} 94_{10} \\ \underline{} \\ 94 \\ \underline{-64} \\ 30 \\ \underline{-16} \\ 14 \\ \underline{-8} \\ 6 \\ \underline{-4} \\ 2 \end{array}$$

Numbering Systems Assignment

This is an open notes/open book assignment. You need to pass in the work with the answers.

Binary conversion:

- $111001_2 = \underline{\hspace{2cm}}_{10}$
- $91_{10} = \underline{\hspace{2cm}}_2$
- $1010100101_2 = \underline{\hspace{2cm}}_{10}$
- $356_{10} = \underline{\hspace{2cm}}_2$

1110
8421

101
1110 = 14
111 = 7
+ 100 = 4
421
11001
168421

0
1
10
11
100

Binary arithmetic:

100	11111	110111	110101
11	111	1001	111010
+ 11	+11010	+101101	+111111
1110	10101	1110111	100001
-1010	- 1100	- 11101	- 11111

Hexadecimal conversion:

- $E8_{16} = \underline{\hspace{2cm}}_{10}$
- $437_{10} = \underline{\hspace{2cm}}_{16}$
- $A5CF_{16} = \underline{\hspace{2cm}}_{10}$
- $7825_{10} = \underline{\hspace{2cm}}_{16}$
- $111000111101_2 = \underline{\hspace{2cm}}_{16}$

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Binary conversion:

$111001_2 = \underline{\hspace{2cm}}_{10}$
 $91_{10} = \underline{\hspace{2cm}}_2$
 $1010100101_2 = \underline{\hspace{2cm}}_{10}$
 $356_{10} = \underline{\hspace{2cm}}_2$

Binary arithmetic:

$\begin{array}{r} 100 \\ 11 \\ + 11 \\ \hline \end{array}$	$\begin{array}{r} 11111 \\ 111 \\ +11010 \\ \hline \end{array}$	$\begin{array}{r} 110111 \\ 1001 \\ +101101 \\ \hline \end{array}$	$\begin{array}{r} 110101 \\ 111010 \\ +111111 \\ \hline \end{array}$
--	---	--	--

(Note: The last binary addition result is circled in blue in the original image.)

$\begin{array}{r} 1110 \\ -1010 \\ \hline \end{array}$	$\begin{array}{r} 10101 \\ - 1100 \\ \hline \end{array}$	$\begin{array}{r} 1110111 \\ - 11101 \\ \hline \end{array}$	$\begin{array}{r} 100001 \\ - 11111 \\ \hline \end{array}$
--	--	---	--

Hexadecimal conversion:

$E8_{16} = \underline{\hspace{2cm}}_{10}$
 $437_{10} = \underline{\hspace{2cm}}_{16}$
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 $7825_{10} = \underline{\hspace{2cm}}_{16}$
 $111000111101_2 = \underline{\hspace{2cm}}_{16}$

Handwritten notes in green:

- 1110
- 8421
- 101
- 1110 = 14
- 111 = 7
- + 100 = 4
- 11001
- 168421
- 25
- A vertical box containing: 0, 1, 10, 11, 100

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$356_{10} = \underline{\hspace{2cm}}_2$

Binary arithmetic:

100	11111	110111	110101
11	111	1001	111010
+ 11	+11010	+101101	+111111

1110	10101	1110111	100001
<u>-1010</u>	<u>- 1100</u>	<u>- 11101</u>	<u>- 11111</u>

Hexadecimal conversion:

$E8_{16} = \underline{\hspace{2cm}}_{10}$

$437_{10} = \underline{\hspace{2cm}}_{16}$

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$7825_{10} = \underline{\hspace{2cm}}_{16}$

$111000111101_2 = \underline{\hspace{2cm}}_{16}$

101111

110101

111010

+ 111111

10101110

Binary Decimal

0	0
1	1
10	2
11	3
100	4
101	5
110	6
111	7

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Binary conversion:

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 $9_{10} = \underline{\hspace{2cm}}_2$
 $1010100101_2 = \underline{\hspace{2cm}}_{10}$
 $356_{10} = \underline{\hspace{2cm}}_2$

Binary arithmetic:

100	11111	110111	110101
+ 11	+11010	+101101	+111111
1110	10101	1110111	100001
<u>-1010</u>	<u>- 1100</u>	<u>- 11101</u>	<u>- 11111</u>

$$\begin{array}{r} 1000 - 4 \\ - 10 - 2 \\ \hline 10 \\ \hline 100 \end{array}$$

$$\begin{array}{r} 100 \\ \hline 100 \end{array}$$

Hexadecimal conversion:

$E8_{16} = \underline{\hspace{2cm}}_{10}$
 $437_{10} = \underline{\hspace{2cm}}_{16}$
 $A5CF_{16} = \underline{\hspace{2cm}}_{10}$
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$356_{10} = \underline{\hspace{2cm}}_2$

Binary arithmetic:

100	11111	110111	110101
11	111	1001	111010
+ 11	+11010	+101101	+111111
1110	10101	1110111	100001
<u>-1010</u>	<u>- 1100</u>	<u>- 11101</u>	<u>- 11111</u>

Hexadecimal conversion:

$E8_{16} = \underline{\hspace{2cm}}_{10}$

$437_{10} = \underline{\hspace{2cm}}_{16}$

$A5CF_{16} = \underline{\hspace{2cm}}_{10}$

$7825_{10} = \underline{\hspace{2cm}}_{16}$

$111000111101_2 = \underline{\hspace{2cm}}_{16}$

Dec	Hex	Base
0	0	16
1	1	0...9
2	2	A, B, C,
3	3	D, E, F
4	4	
5	5	
6	6	
7	7	
8	8	
9	9	
10	A	
11	B	
12	C	
13	D	
14	E	
15	F	
16	10	
17	11	

1	1
+	FF
<hr/>	
1	00

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Groups

36 Nov 29-11:47 AM

37 Nov 29-11:47 AM

38 Nov 29-11:47 AM

39 Nov 29-11:51 AM

40 Nov 29-11:51 AM

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Dec

Hex

Base

0 — 0

1 — 1

2 — 2

3 — 3

4 — 4

5 — 5

6 — 6

7 — 7

8 — 8

9 — 9

10 — A

11 — B

12 — C

13 — D

14 — E

15 — F

16 — 10

17 — 11

1
1F
+ 1
——
20

0...9
A, B, C,
D, E, F

1
1
FF
+ 1
——
100

41817
10

A 3 5 9

4096 256 16 1
 16^3 16^2 16^1 16^0

41817
40960

857

~~9~~57
-768

857
-768
89
-80
9

~~9~~9
-80

3+256
-768