1. Log in
2. Open Netbeans and Moodle
3. Did you finish Unit 1 WS 04?
4. Did you enter your answers online?

Sep 28-7:21 AM

Review Binary = base 2 numbers

101001_{bin}

$2^5 \quad 2^4 \quad 2^3 \quad 2^2 \quad 2^1 \quad 2^0$

Remember: Start on the right side

Binary digits basically tell you how many of each 2^x exist

$(1)2^5 + (0)2^4 + (1)2^3 + (0)2^2 + (0)2^1 + (1)2^0$

$(1)32 + (0)16 + (1)8 + (0)4 + (0)2 + (1)1 = 41_{dec}$

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In other words, remember ...

128, 64, 32, 16, 8, 4, 2, 1

10110110_{bin}

Remember: Start on the right side

$(1)2^7+(0)2^6+(1)2^5+(1)2^4+(0)2^3+(1)2^2+(1)2^1+(0)2^0$

128 + ... + 32 + 16 + ... + 4 + 2 + ...

$= 182_{dec}$

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Now Octal Numbers = Base 8 numbers

1001_{oct}

$8^3 \quad 8^2 \quad 8^1 \quad 8^0$

Remember: Start on the right side

Octal digits basically tell you how many of each 8^x exist
--- Now $8^0 = 1$, so we now can use the digits 0-8 for base 8 (we used 0-1 for base 2)
--- So the numbers are 512, 64, 8, 1

$(1)8^3 + (0)8^2 + (0)8^1 + (1)8^0$

$(1)512 + (0)64 + (0)8 + (1)1 = 513_{dec}$

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Remember, base 8 can use 0-7

2031_{oct}

$8^3 \quad 8^2 \quad 8^1 \quad 8^0$

Remember: Start on the right side

Octal digits basically tell you how many of each 8^x exist
--- Now $8^0 = 1$, so we now can use the digits 0-8 for base 8 (we used 0-1 for base 2)
--- So the numbers are 512, 64, 8, 1

$(2)8^3 + (0)8^2 + (3)8^1 + (1)8^0$

$(2)512 + (0)64 + (3)8 + (1)1 = 1049_{dec}$

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Try one or two on your own ...

Do you notice that you don't need as many bits to create larger numbers?

$1233_{oct} = 667_{dec}$

$0147_{oct} = 103_{dec}$

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One more - Hexadecimal Numbers (base 16)

101_{hex}

$16^2 \quad 16^1 \quad 16^0$

Remember: Start on the right side

Hexadecimal digits basically tell you how many of each 16^x exist
--- Now $16^0 = 1$, so we now can use the digits 0-15 for base 16 (but, 15 is 2-digits = go letters)
--- Uses 0-9, A, B, C, D, E, F
--- 0-9, A=10, B=11, C=12, D=13, E=14, F=15

$(1)16^2 + (0)16^1 + (1)16^0$

$(1)256 + (0)16 + (1)1 = 257_{dec}$

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One more - Hexadecimal Numbers (base 16)

$2AD_{hex}$

$16^2 \quad 16^1 \quad 16^0$

Remember: Start on the right side

0-9, A=10, B=11, C=12, D=13, E=14, F=15

$(2)16^2 + (10)16^1 + (13)16^0$

$(2)256 + (10)16 + (13)1 = 685_{dec}$

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Now Decimal to Octal ...

$283_{dec} \longrightarrow ?_{oct}$

Remember: **Divide by 8**, track the remainders until you get division answer 0 and remainder 0-7

283	
35	3
4	3
0	4

433_{oct}

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Review Decimal to Binary ...

$283_{dec} \longrightarrow ?_{bin}$

Remember: Divide by 2, track the remainders until you get division answer 0 and remainder 1 or 0

283	
141	1
70	1
35	0
17	1
8	1
4	0
2	0
1	0
0	1

100011011_{bin}

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Now Decimal to Octal ...

$278_{dec} \longrightarrow ?_{oct}$

Remember: **Divide by 8**, track the remainders until you get division answer 0 and remainder 1 or 0

278	
34	6
4	2
0	4

426_{oct}

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Now Decimal to Octal ...

$721_{dec} \longrightarrow ?_{oct}$

Remember: **Divide by 8**, track the remainders until you get division answer 0 and remainder 1 or 0

721	
90	1
11	2
1	3
0	1

1321_{oct}

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NOW decimal to Hexadecimal!!!

$721_{dec} \longrightarrow ?_{hex}$

Remember: **Divide by 16**, track the remainders until you get division answer 0 and remainder 1 or 0

721	
45	1
2	13
0	2

0-9, A=10, B=11, C=12, D=13, E=14, F=15

$2D1_{hex}$

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NOW decimal to Hexadecimal!!!

$3410_{dec} \longrightarrow ?_{hex}$

Remember: **Divide by 16**, track the remainders until you get division answer 0 and remainder 1 or 0

3419	
213	11
13	5
16	13

0-9, A=10, B=11, C=12, D=13, E=14, F=15

$D5B_{hex}$

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What if we want Hex -> Binary?

$A3F_{hex} \longrightarrow ?_{bin}$

0-9, A=10, B=11, C=12, D=13, E=14, F=15

Two ways: 1) To dec first 2) Convert each digit to four bits

WAY #1

$A3F_{hex} = (10)16^2 + (3)16^1 + (15)16^0 = 2623$

2623	
1311	1
655	1
327	1
163	1
81	1
40	1
20	0
10	0
5	0
2	1
1	0
0	1

$1010\ 0011\ 1111_{bin}$

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What if we want Hex -> Binary?

$A3F_{hex} \longrightarrow ?_{bin}$

0-9, A=10, B=11, C=12, D=13, E=14, F=15

Two ways: 1) To dec first 2) Convert each digit to four bits

WAY #2

$A3F_{hex}$

A	3	F
10	3	15
1010	0011	1111

$1010\ 0011\ 1111_{bin}$

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What if we want Oct -> Binary?

$721_{oct} \longrightarrow ?_{bin}$

0-9, A=10, B=11, C=12, D=13, E=14, F=15

Just go to decimal first

7	2	1

$(7)8^2 + (2)8^1 + (1)8^0$

$448 + 16 + 1 = 465_{dec}$

465	
232	1
116	0
58	0
29	0
14	1
7	0
3	1
1	1
0	1

$0001\ 1111\ 0001_{bin}$

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Checklist for today ...

- ☐ Understand today's lesson
- ☐ Complete Unit 1 Worksheet 05
- ☐ Enter Worksheet Answers in Moodle (counts as a grade, retake once)
- ☐ Review documents for converting can be found on course website

Sep 28-9:44 AM