COMPSCI 210 S1T 2007 Tutorial One

Transformation of the number:

1. Transforms binary, octal, and hexadecimal to **decimal**

110011 (base 2) is:
110011_2 = 1 x 2**5 + 1 x 2**4 + 0 x 2**3 + 0 x 2**2+ 1 x 2**1 +1 x 2**0= 51_{10}

33617 (base 8) is:
33617_8 = 3 x 8**4 + 3 x 8**3 + 6 x 8**2 + 1 x 8 **1 + 7 x 8**0 = 28439_{10}

ACF7 (base 16) is:
$ACF7_{16}$ = 10 x 16**3 + 12 x 16**2 + 15 x 16**1 +7 x 16**0 = 44279_{10}

2. Transforms decimal, octal, and hexadecimal to **binary**

Method: subtract largest power of 2 smaller than 81 until you reach 1:
81_{10}=64+16+1=2**6+2**4+0+0+0+2*0= 1010001_2

Tip: Best way to transform from decimal to octal is to go via Binary Octal representation to binary representation

745_8 = 7x 8**2 + 4 x 8**1 + 5 x 8**0
In Binary: 111 100 101 111100101_2
$D8F_{16}$ = 13 x 16**2 + 8 x 16**1 + 15 x6 **0
In Binary: 1101 1000 1111 110110001111_2

3. Transforms binary, decimal, and hexadecimal to **octal**

110100101010110_2 = 110 100 101 010 110_2 = 64526_8
161_{10}=128+32+1=2**7+2**5+0+0+0+0+2**0= 10100001_2 → ***0***10 100 001_2 → 241_8

$AEF78_{16}$ = 1010 1110 1111 0111 1000_2 = ***0***10 101 110 111 101 111 000_2 = 2567570_8

4. Transforms binary, octal, and decimal to **hexadecimal**

$10101111100111010101 1_2$ = ***000***1 0101 1111 0011 1010 1011_2 = $15F3AB_{16}$

57672_8 101 111 110 111 010_2 → ***0***101 1111 1011 1010_2 → $5FBA_{16}$

6656_{10} = 4096 + 2048 + 512 =
2**12+2**11+0+2**9+0+0+0+0+0+0+0+0+0=1101000000000_2 → ***0000***1 1010 0000 0000 → $1A00_{16}$

Exercise:

1. Transform to binary

712_8

6634_8

236_{10}

729_{10}

9394_{16}

$AFED_{16}$

2. Transform to Decimal

1010110101001_2

1111111111111111_2

$CCDE_{16}$

800_{16}

7777_8

4000_8

3. Transform to octal

1010110101001_2

1111111111111111_2

$93F4_{16}$

$AFFF_{16}$

1111_{10}

9999_{10}

4. Transform to hexadecimal

$10101011101010001001010101_2$

1111111111111111_2

712_8

6634_8

1111_{10}

9999_{10}

5. Transform to base X to base X**k, k = 1, 2, 3…n.

2212122221 (base 3) to its base 9 number

2212122221 (base 3) to its base 27 number

3123213231 (base 4) to its base 16 number

Solution:

1.

712_8=**111001010_2**

6634_8=**110110011100_2**

236_{10}=**11101100_2**

729_{10}=**1011011001_2**

9394_{16}=**1001001110010100_2**

$AFED_{16}$=**1010111111101101_2**

2.

1010110101001_2=**5545_{10}**

1111111111111111_2=**65535_{10}**

$CCDE_{16}$=**52446_{10}**

800_{16}=**2048_{10}**

7777_8=**4095_{10}**

4000_8=**2048_{10}**

3.

1010110101001_2=**12651_8**

1111111111111111_2=**177777_8**

$93F4_{16}$=**111764_8**

$AFFF_{16}$=**127777_8**

1111_{10}=**2127_8**

9999_{10}=**23417_8**

4.

$1010101110101000100101010 1_2$=**$2AEA255_{16}$**

1111111111111111_2= **$FFFF_{16}$**

712_8=**$1CA_{16}$**

6634_8= **$D9C_{16}$**

1111_{10}=**457_{16}**

9999_{10}=**$270F_{16}$**

5.

2212122221 (base 3) =85587_9

2212122221 (base 3) =$2NHP_{27}$

3123213231 (base 4) =$DB9ED_{16}$