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Exercises about representation of information

DW1E

1. Convert from decimal to binary:

To convert to binary I use a table with the powers of two and write a 1 to the nearest value below the number I am looking for, then save the value and repeat if the value is greater I write a zero.

a. 234= 1 1 1 0 1 0 1 0

Operation:

256 128 64 32 16 8 4 2 1

 0   1   1 1 0 1 0 1 0

b. 555= 1000101011

Operation:

512 256 128 64 32 16 8 4 2 1

 1   0   0   0 1 0 1 0 1 1

c.12321=11000000100001

Operation:

8192 4096 2048 1024 512 256 128 64 32 16 8 4 2 1

   1   1   0   0   0   0   0   0 1 0 0 0 0 1

d. 152=10011000

Operation:

128 64 32 16 8 4 2 1

  1   0   0 1 1 0 0 0

e. 32768= 2^16 = 1000 0000 0000 0000

-2. Convert from binary to decimal:

To convert from binary to decimal I add the powers of two that have a one

a. 100000000= 2^8= 256

b. 1011110100= 756

c. 10011101= 157

d.11111111111=2^-1= 2047

3. Convert from hexadecimal to binary:

To Convert from Hexadecimal to binary we use the following table.

0000=0

0001=1

0010=2

0011=3

0100=4

0101=5

0110=6

0111=7

1000=8

1001=9

1010=A

1011=B

1100=C

1101=d

1110=E

1111=F

a. 45A0= 100010110100000

b. CF=11001111

c. AAB2= 1010101010110010

d. 3020= 1100000100000

4. Convert from binary to hexadecimal:

a. 1 1000 1000 =188

b. 1 0001 0110= 116

5. Complete the following conversions related to octal numeral system:

a. Convert the numbers from exercise 4 to octal.

110 001 000= 610

100 010 110= 426

6. Fill in the gaps, using all the conversions you need. You have to write the steps to transform each number.

BINARY	DECIMAL	HEXADECIMAL	OCTAL
100001	33	21	41
11111111	255	FF	377
11111111	255	FF	377
10 0001	33	21	41

33 to Binary= 2^5+1=100001 – 100001 To Hexadecimal = 21 – 100001 To Octal = 41

FF To Binary=11111111= 2^8-1 = 255 – 11111111 To Octal= 377

7. How many bits do you need to represent the following numbers in binary? a. hexadecimal: 4B, 4AA, FF4FA, 345F

4B=1001011=7 bits

4AA=10010101010 =11 bits

FF4FA= 11111111010011111010=20 bits

345F=11010001011111=14bits

b. decimal: 100, 256, 255, 32, 31, 3, 4350, 1024, 45, 2^30 , 63

100=1100100=7 bits

256=2^8=9 bits

255=2^8-1=8 bits

32=2^5=6 bits

31=2^5-1=5bits

3=11=2 bits

4350=1000011111110=13 bits

1024=2^11=11 bits

45=1010101=7 bits

2^30=30 bits

63=2^7-1=6 bits

8. Solve the following parts using ASCII extended (8 bits).

a. Write a random text, which contains letters, numbers and other alphanumeric characters.

b. Encode to hexadecimal, according ASCII table.

c. Convert to binary

a: Hola29@

b: 486F6C61323940

c: 10010000110111101101100011000010011001000111001010000000