Jordan Winkler
Computer Architecture
Mon Feb 4 23:06:09 EST 2019
hw4

1. Convert the hexadecimal number C 7 B 4 9 D to binary.

$(12, 7, 11, 4, 9, 13)_{16} = (110001111011010010011101)_2$

2. Convert the decimal number 315 directly into octal - do NOT convert to binary, hex, etc. as an intermediate step.

$315/8 = 39$ R 3
$39/8 = 4$ R 7
$4/8 = 0$ R 4

$(473)_8$

3. Using expanded notation, convert the hexadecimal number E 6 F 3 into decimal.

$(E6F3)_{16} = (14, 6, 15, 3)_{16} = (14 * 16^3 + 6 * 16^2 + 15 * 16^1 + 3 * 16^0)_{10} = 59123_{10}$

4. Convert the decimal number -85 to the 2s complement 8-bit form.

$85/2 = 42$ R 1
$42/2 = 21$ R 0
$21/2 = 10$ R 0
$10/2 = 5$ R 0
$5/2 = 2$ R 1
$2/2 = 1$ R 0
$1/2 = 0$ R 1

01010101_2

$10101010_{1-complement}$

$10101011_{2s-complent}$

5. If I have 198 unique items to represent, how many bits do I need to do this?

$\lceil log_2(198) \rceil = 8_{10}$ bits

6. Consider the number: 1 0 1 1 0 0 1 1

a) What is this, in decimal, if it is an unsigned binary number?

$(10110011)_2 = (128 + 32 + 16 + 2 + 1)_{10} = 179_{10}$

b) What is this, in decimal, if it is a ones complement number?

$(10110011)_{1-comp} = -(1001100)_2 = -(4 + 8 + 64)_{10} = -76_{10}$

c) What is this, in decimal, if it is a twos complement number?

$(10110011)_{2-comp} = -(1001101)_2 = -(1 + 4 + 8 + 64)_{10} = -77_{10}$

7. Convert the binary number 0 1 1 0 0 1 1 0 1 0 1 0 1 into octal.

$(0110011010101)_2 = (110011010101)_2 = (6325)_8$

8. Consider the number: 0 1 0 1 1 0 0 1

a) What is this, in decimal, if it is an unsigned binary number?

$(01011001)_2 = (1 + 8 + 16 + 32 + 128)_{10} = (185)_{10}$

b) What is this, in decimal, if it is a ones complement number?

$(01011001)_{1-comp} = (1 + 8 + 16 + 32 + 128)_{10} = (185)_{10}$

c) What is this, in decimal, if it is a twos complement number?

$(01011001)_{2-comp} = (1 + 8 + 16 + 32 + 128)_{10} = (185)_{10}$

d) What is this, in decimal, if it is a sign-magnitude number?

$(01011001)_{sign-mag} = (1 + 8 + 16 + 32 + 128)_{10} = (185)_{10}$