HW#2 디지털 회로 설계 및 언어 2015104027 박경민

2y+

1. $(11010.0101)_2$ convert to decimal and Hexadecimal

unsigned

$(11010.0101)_2 = 1\times2^4 + 1\times2^3 + 0\times2^2 + 1\times2^1 + 0\times2^0 + 0\times2^{-1} + 1\times2^{-2} + 0\times2^{-3} + 1\times2^{-4}$

$= (26.3125)_{10}$

to hexadecimal

first $26.3125 = (26)_{10} + (0.3125)\times16/16$

$= (1A)_{16} + (5)_{16}/16$

$= (1A.5)_{16}$

second $(0001/1010.0101)_2 \rightarrow (1A.5)_{16}$

1 A 5

signed - complement

$(11010.0101)_2$ MSB : 1 negative

2's complement $(00101.1011)_2$

$\rightarrow (5.6875)_{10}$

∴ $(11010.0101)_2 = (-5.6875)_{10}$

to hexadecimal

first $(-5.6875)_{10}$

$(5.6875)_{10} = (5)_{10} + (0.6875\times16)/16$

$= (5)_{16} + (B)_{16}/16$

$= (05.B)_{16}$

16's complement ⇒ $(FA.5)_{16}$

second $(1111/1010.0101)_2 \rightarrow (FA.5)_{16}$

F A . 5

∴ unsigned

$(11010.0101)_2$

$= (26.3125)_{10} = (1A.5)_{16}$

signed

$(11010.0101)_2$

$= (-5.6875)_{10}$

$= (FA.5)_{16}$

2. -25 -33 보수를 이용한 덧셈 (2's complement)

$(-25)_{10} \Rightarrow (25)_{10} \rightarrow (0\,1\,1\,0\,0\,1)_2 \rightarrow$ 2's complement $(1\,0\,0\,1\,1\,1)_2$

$(-33)_{10} \Rightarrow (33)_{10} \rightarrow (0\,1\,0\,0\,0\,1)_2 \rightarrow$ 2's complement $(1\,0\,1\,1\,1\,1)_2$

bit extension, overflow 방지

$$\begin{array}{rl} -25 & \\ -33 & \end{array} \Rightarrow \begin{array}{r} 1\,0\,0\,1\,1\,1 \\ +\,1\,0\,1\,1\,1\,1 \\ \hline \end{array} \qquad \begin{array}{r} 1\,1\,1\,0\,0\,1\,1\,1 \\ +\,1\,1\,0\,1\,1\,1\,1 \\ \hline 1\,1\,1\,0\,0\,0\,1\,1\,0 \end{array}$$

end carry 버림.

bit extension 과정을 생략시켜본 것

$(1\,1\,0\,0\,0\,1\,1\,0)_2 = (1\,0\,0\,0\,1\,1\,0)_2 \rightarrow$ 2's complement $\rightarrow (0\,0\,1\,1\,1\,0\,1\,0)_2 \rightarrow (158)_{10}$

↳ 확인

$\therefore \quad (1\,0\,0\,0\,1\,1\,0)_2 = -25-33 = (-58)_{10}$