Galala University, Faculty of Computer Science and Engineering

CSE 131 Logic Design

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Homework 2 solution

Perform subtraction on the following unsigned binary numbers using the 2's-complement of the subtrahend. Where the result should be negative, 2's-complement it and affix a minus sign.
(a) 11011-11001 (b)110100 -10101 (c)1011-110000 (d)101010-101011

Solution:

a)

$X = 11011 \quad Y = 11001$

$$\begin{aligned} X &= \quad 11011 \\ 2\text{'s Complement of } Y &= +\ \underline{00111} \\ Sum &= \quad 100010 \\ \text{Discard end carry } 2^5 &= -\underline{100000} \\ \text{Answer: } X - Y &= \quad 00010 \end{aligned}$$

b)

$X = 110100 \quad Y = 10101$

$$\begin{aligned} X &= \quad 110100 \\ 2\text{'s Complement of } Y &= +\ \underline{101011} \\ Sum &= \quad 1011111 \\ \text{Discard end carry } 2^5 &= -\underline{1000000} \\ \text{Answer: } X - Y &= \quad 011111 \end{aligned}$$

c)

$X = 1011 \quad Y = 110000$

$$\begin{aligned} X &= \quad 1011 \\ 2\text{'s Complement of } Y &= +\ \underline{010000} \\ Sum &= \quad 011011 \\ \text{There is no end carry} & \\ \text{Answer: } Y - X &= -\ 100101 \end{aligned}$$

d)

$X = 101010 \quad Y = 101011$

$$\begin{aligned} X &= \quad 101010 \\ 2\text{'s Complement of } Y &= +\ \underline{010101} \\ Sum &= \quad 111111 \\ \text{There is no end carry} & \\ \text{Answer: } Y - X &= -\ 000001 \end{aligned}$$