Hw10

Monday, November 8, 2021 4:25 PM

1) [1 point]

Write the **6-digit** sign and magnitude representation of $(-5413)_6$

$(-5413)_6$ = SM(505413)$_6$

Looks good

Save

$(-5413)_6 = SM(505413)_6$

2) [1 point]

Write the **6-digit** diminished radix representation of $(-6326)_9$

$(-6326)_9$ = DR(Not correct 222234)$_9$

Try again

Save

$888 - 6326 = 2562$

padding is adding R-1 to the left $\Rightarrow 882562$

3) [1 point]

Write the **6-digit** radix representation of $(-1210)_3$

$(-1210)_3$ = R(Not correct)$_3$

Try again

Save

$222222 - 1210 = 221012$

$221012 + 1 = 221013$

3 can't be a number in base 3 $\Rightarrow$ turn it into a 0 and add 1 to the next place $\Rightarrow 221020$

4) [1 point]

Write the **12-digit** signed two's complement representation of the decimal number $(-346)_{10}$.

$(-346)_{10}$ = R(1110 1010 0110)$_2$

Save

$346/2 = 173 - 0$ $\quad 10/2 = 5 - 0$ $\quad 000101011010$

$173/2 = 86 - 1$ $\quad 5/2 = 2 - 1$

$86/2 = 43 - 0$ $\quad 2/2 = 1 - 0$ $\quad 1110/1010/0101 \Rightarrow +1$

$43/2 = 21 - 1$ $\quad 1/2 = 0 - 1$

$21/2 = 10 - 1$

$0101 + 1 = 0110$

$1110/1010/0110$

5) [1 point]

Write the sign-extended **8-digit** signed two's complement representation of the 6-digit signed two's complement value $(111100)_2$

$(111100)_2$ = R(1111 1100)$_2$

Save

6) [1 point]

Write the sign-extended **8-digit** signed two's complement representation of the 6-digit signed two's complement value $(000110)_2$

$(000110)_2$ = R(0000 0110)$_2$

Save

7) [1 point] 64 32 16 8 4 2 1

The value of A is 41 and the value of B is 14.

Write the **8-digit** two's complement representation of A and -B:

A = R(0010 1001)$_2$ $\quad 41 \Rightarrow 0010\ 1001$

-B = R(1111 0010)$_2$ $\quad -14 \Rightarrow 0000\ 1110 \Rightarrow 1111\ 0001 + 1 \Rightarrow 1111\ 0010$

Now compute the **8-digit** two's complement addition of the two binary quantities above.

A-B = R(0001 1011)$_2$

$$\begin{array}{rr} (41) & 0010\ 1001 \\ (-14) + & 1111\ 0010 \\ \hline & 10001\ 1011 \end{array}$$

Now convert that binary value back to a negative or positive number in base 10.
(Express it with only as many digits as you need. Make sure the result is A - B.)

A-B = R(27)$_{10}$ $\quad 16+8+2+1 = 27$

Now write the value of -A and B as **8-digit** two's complement numbers.

-A = R(1101 0111)$_2$ $\quad -41 \Rightarrow 0010\ 1001 \Rightarrow 1101\ 0110 + 1 \Rightarrow 1101\ 0111$

B = R(0000 1110)$_2$ $\quad 14 \Rightarrow 0000\ 1110$

Now compute the **8-digit** two's complement addition of the two binary quantities above.

-A+B = R(1110 0101)$_2$

$$\begin{array}{rr} (-41) & 1101\ 0111 \\ (14) & +0000\ 1110 \\ \hline & 11100101 \end{array}$$

Now convert that binary value back to a negative or positive number in base 10.
(Express it with only as many digits as you need. Make sure the result is B - A.)

-A+B = R(-27)$_{10}$

This is an example of how you can check your own work when constructing the answers to questions.

8) [1 point]

For the questions below, the value of A = R(00272837)$_{10}$ and B = R(00799737)$_{10}$.

Write the **8-digit** ten's complement of B:

-B = R(99200263)$_{10}$ $\quad (10^8 - 1) - 00799737 + 1 = 99200263$

Write the **8-digit** ten's complement addition of A and -B:

A-B = R(99473100)$_{10}$ $\quad 99200263 + 00272837 = 99473100$

Now, write the **8-digit** ten's complement of A:

-A = R(99727163)$_{10}$ $\quad (10^8 - 1) - 00272837 + 1 = 99727163$

Write the **8-digit** ten's complement addition of -A and B:

-A+B = R(00526900)$_{10}$ $\quad 99727163 + 00799737 = 100526900$

Save

9) [1 point]

For the following 8-bit binary addition,

$$\begin{array}{r} 11110100 \\ +\ 00011101 \end{array}$$

when implemented with a carry lookahead adder, what are the values of $G_7 \ldots G_0, P_7 \ldots P_0, C_7 \ldots C_0$? Assume the carry-in to the 8-bit adder (C_{-1}) is 0.

G_7= 0 G_6= 0 G_5= 0 G_4= 1 G_3= 0 G_2= 1 G_1= 0 G_0= 0

P_7= 1 P_6= 1 P_5= 1 P_4= 0 P_3= 1 P_2= 0 P_1= 0 P_0= 1

C_7= 1 C_6= 1 C_5= 1 C_4= 1 C_3= 1 C_2= 1 C_1= 0 C_0= 0

$C_{-1} = C_{in}$

$C_0 = G_0 + C_{in} \cdot P_0$

$C_1 = G_1 + C_0 \cdot P_1$

$C_2 = G_2 + C_1 \cdot P_2$

$C_3 = G_3 + C_2 \cdot P_3$

$G_0 = 0 \cdot 1 = 0$ $\quad G_4 = 1 \cdot 1 = 1$

$G_1 = 0 \cdot 0 = 0$ $\quad G_5 = 1 \cdot 0 = 0$

$G_2 = 1 \cdot 1 = 1$ $\quad G_6 = 1 \cdot 0 = 0$

$G_3 = 0 \cdot 1 = 0$ $\quad G_7 = 1 \cdot 0 = 0$

$P_0 = 1$ $\quad P_5 = 1$

$P_1 = 0$ $\quad P_6 = 1$

$P_2 = 0$ $\quad P_7 = 1$

$P_3 = 1$

$P_4 = 0$

$C_0 = 0 + 0 \cdot 1 = 0$

$C_1 = 0 + 0 \cdot 0 = 0$

$C_2 = 1 + 0 = 1$

$C_3 = 0 + 1 \cdot 1 = 1$

$C_4 = 1 + 1 \cdot 0 = 1$

$C_5 = 0 + 1 \cdot 1 = 1$

$C_6 = 0 + 1 \cdot 1 = 1$

$C_7 = 0 + 1 \cdot 1 = 1$

$G_i = X_i \cdot Y_i$

$P_i = X_i \oplus Y_i \Rightarrow P_i = 1$ if $X_i = 0$ and $Y_i = 1$ or $X_i = 1$ and $Y_i = 0$

10) [1 point]

For the following 8-bit binary addition,

$$\begin{array}{r} 01011011 \\ +\ 10011011 \end{array}$$

when implemented with a carry lookahead adder, what are the values of $G_7 \ldots G_0, P_7 \ldots P_0, C_7 \ldots C_0$? Assume the carry-in to the 8-bit adder (C_{-1}) is 0.

G_7= 0 G_6= 0 G_5= 0 G_4= 1 G_3= 1 G_2= 0 G_1= 1 G_0= 1

P_7= 1 P_6= 1 P_5= 0 P_4= 0 P_3= 0 P_2= 0 P_1= 0 P_0= 0

C_7= 0 C_6= 0 C_5= 0 C_4= 1 C_3= 1 C_2= 0 C_1= 1 C_0= 1

$G_7 = 0$ $\quad P_7 = 1$ $\quad C_7 = 0 + 1 \cdot 0 = 0$

$G_6 = 0$ $\quad P_6 = 1$ $\quad C_6 = 0 + 1 \cdot 0 = 0$

$G_5 = 0$ $\quad P_5 = 0$ $\quad C_5 = 0 + 1 \cdot 0 = 0$

$G_4 = 1$ $\quad P_4 = 0$ $\quad C_4 = 1 + 1 \cdot 0 = 1$

$G_3 = 1$ $\quad P_3 = 0$ $\quad C_3 = 1 + 0 \cdot 0 = 1$

$G_2 = 0$ $\quad P_2 = 0$ $\quad C_2 = 0 + 1 \cdot 0 = 0$

$G_1 = 1$ $\quad P_1 = 0$ $\quad C_1 = 1 + 1 \cdot 0 = 1$

$G_0 = 1$ $\quad P_0 = 0$ $\quad C_0 = 1 + 0 = 1$