Answer on Question #57255 - Math - Discrete Math

Question

1. Add the following 8-bit binary numbers .

i. (01001110)2 + (00111100)2

ii.(10011101)2 + (10001111)2

Solution

i.

We start with the two numbers in the far right column, add the numbers following the rules of addition

$0 + 0 = 0,\ 0 + 1 = 1,\ 1 + 0 = 1,$

Unless both numbers are 1.

0 1 0 0 1 1 1 0

0 0 1 1 1 1 0 0

_____

0

If both numbers are 1, then

$1 + 1 = 10$

and write 0 below and carry '1' to the next column.

Start on the next column to the left hand side

0 1 0 0 1 1 1 0

0 0 1 1 1 1 0 0

_____

1 0

Repeat the steps above, but add any carry. Rememeber that 1+1=10 and 1+1+1=11

0 1 0 0 1 1 1 0

0 0 1 1 1 1 0 0

_____

1 0 0 0 1 0 1 0

Thus,

$$(01001110)_2 + (010111100)_2 = (10001010)_2$$

ii.

We start with the two numbers in the far right column, add the numbers following the rules of addition

$0 + 0 = 0,\ 0 + 1 = 1,\ 1 + 0 = 1,$

Unless both numbers are 1.

If both numbers are 1, then

$1 + 1 = 10$

and write 0 below and carry ‘1’ to the next column.

1 0 0 1 1 1 0 1

1 0 0 0 1 1 1 1

_____

0

Start on the next column to the left hand side. Repeat the steps above, but add any carry. Rememeber that 1+1=10 and 1+1+1=11

1 0 0 1 1 1 0 1

1 0 0 0 1 1 1 1

_____

0 0

Repeat the steps above, but add any carry. Rememeber that 1+1=10 and 1+1+1=11

1 0 0 1 1 1 0 1

1 0 0 0 1 1 1 1

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1 0 0 1 0 1 1 0 0

Thus,

$(10011101)_2 + (10001111)_2 = (100101100)_2 - overflow.$

Answer: i. $(10001010)_2$. **ii.** $(100101100)_2$.