Discrete Mathematics
Adding Binary Numbers

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Rules of Binary Addition

- $0 + 0 = 0$
- $0 + 1 = 1$
- $1 + 0 = 1$
- $1 + 1 = 0$
  (and carry 1 to the next more significant bit)
- $1 + 1 + 1 = 1$
  (and carry 1 to the next more significant bit)

Binary Addition

Add the following pairs of binary numbers.

1. $111_{(2)} + 1110_{(2)}$

2. $11010_{(2)} + 1100_{(2)}$

3. $10011_{(2)} + 111110_{(2)}$

Binary Addition

- Align the numbers you wish to add from the right hand side.
- Start with the two numbers in the far right column, and work towards the left-hand side.
- (For ease of use, we add a zero to have the same number of digits)

$$0111$$

$$1110$$

Question 1 : $111_{(2)} + 1110_{(2)}$

$$0111$$

$$1110$$

Answer : $111_{(2)} + 1110_{(2)} = 10101_{(2)}$

Question 2 : $11010_{(2)} + 1100_{(2)}$

$$11010$$

$$01100$$

Answer : $11010_{(2)} + 1100_{(2)} = 100110_{(2)}$

Question 3 : $10011_{(2)} + 111110_{(2)}$

$$010011$$

$$111110$$

Answer : $10011_{(2)} + 111110_{(2)} = 1010001_{(2)}$

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