Example 8: Binary Addition (Teacher's Guide)

We are adding:

$$a = (1110)_2, \quad b = (1011)_2$$

Step-by-Step Solution

$$\begin{array}{cccccc} & 1 & 1 & 1 & & \\ & 1 & 1 & 1 & 0 & \\ + & 1 & 0 & 1 & 1 & \\ \hline & 1 & 1 & 0 & 0 & 1 \end{array}$$

Hence:

$$(1110)_2 + (1011)_2 = (11001)_2$$

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Practice Problem Solutions

1. $(101)_2 + (11)_2$:

$$101_2 = 5_{10}, \quad 11_2 = 3_{10}, \quad 5 + 3 = 8$$

So, $(101)_2 + (11)_2 = (1000)_2$.

2. $(111)_2 + (1)_2$:

$$111_2 = 7_{10}, \quad 1_2 = 1_{10}, \quad 7 + 1 = 8$$

So, $(111)_2 + (1)_2 = (1000)_2$.

3. $(11011)_2 + (11101)_2$:

$$11011_2 = 27_{10}, \quad 11101_2 = 29_{10}, \quad 27 + 29 = 56$$

So, $(11011)_2 + (11101)_2 = (111000)_2$.