

Add Binary

We walk from right to left, add digits plus a carry, and build the result.

Key Idea:

- Start from the least significant bit (end of both strings).
- For each position: $sum = carry + (\text{digit from } a \text{ if any}) + (\text{digit from } b \text{ if any})$
 - Result digit = $sum \% 2$
 - New carry = $sum / 2$
- At the end, if carry > 0 , append it.
- Reverse the accumulated result string.

Complexity:

- Time: $O(\max(|a|, |b|))$ - each digit processed once
- Space: $O(\max(|a|, |b|))$ for the result string