Adding Binary Numbers

Straight-forward Examples

- Worked Example 1
- Add the 2 8-bit binary numbers
- 1001 1001 & 0000 0100

1	0	0	1	1	0	0	1	
0	0	0	0	0	1	0	0	+
1	0	0	1	1	1	0	1	

- Worked Example 2
- Add the 2 8-bit binary numbers
- 0001 1100 & 1110 0010

0	0	0	1	1	1	0	0	
1	1	1	0	0	0	1	0	+
1	1	1	1	1	1	1	0	

Examples with Carrying Bits

- Worked Example 3
- Add the 2 8-bit binary numbers
- 1001 1001 & 0000 0101

Note: 1 + 1 = 10

Note: 1 + 1 + 1 = 11

•	Worked	Examp	le 4
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- Add the 2 8-bit binary numbers
- 0001 1100 & 0110 0101

						1		
1	0	0	1	1	0	0	1	
0	0	0	0	0	1	0	1	+
1	0	0	1	1	1	1	0	

	1	1	1	1				
0	0	0	1	1	1	0	0	
0	1	1	0	0	1	0	1	+
1	0	0	0	0	0	0	1	

More Examples with Carrying Bits

- Worked Example 5
- Add the 2 8-bit binary numbers
- 1001 1001 & 0001 1101

Bit being carried

		1	1			1		
1	0	0	1	1	0	0	1	
0	0	0	1	1	1	0	1	+
1	0	1	1	0	1	1	0	

- Worked Example 6
- Add the 2 8-bit binary numbers
- 0001 1100 & 0110 1110

	1	1	1	1				
0	0	0	1	1	1	0	0	
0	1	1	0	1	1	1	0	+
1	0	0	0	1	0	1	1	

Examples of Binary Addition-Creating An Overflow Bit

- Worked Example 7
- Add the 2 8-bit binary numbers
- 1101 1001 & 1101 1101

- Worked Example 8
- Add the 2 8-bit binary numbers
- 0111 1100 & 1110 1110

9th Bit Overflow bit

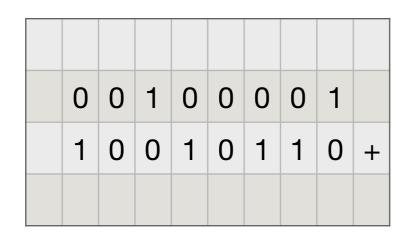
	1		1	1			1		
	1	1	0	1	1	0	0	1	
	1	1	0	1	1	1	0	1	+
1	1	0	1	1	0	1	1	0	

9th Bit Overflow bit

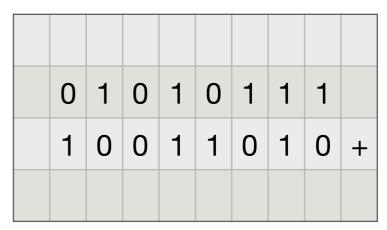
1	0	1	1	0	1	0	1	0	
	1	1	1	0	1	1	1	0	+
	0	1	1	1	1	1	0	0	
	1	1	1	1	1				

Exercises

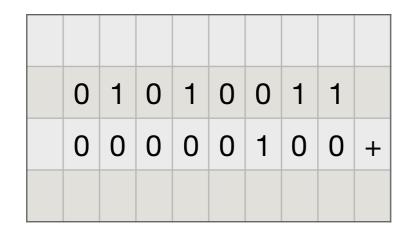
(1) Straight-forward addition



(4) Examples with Carrying



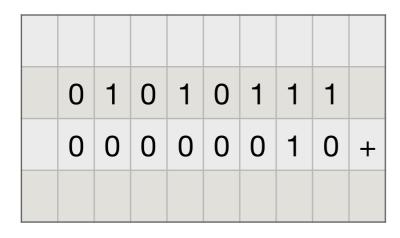
(2) Straight-forward addition



(5) Examples with Creating Overflow Bit



(3) Examples with Carrying

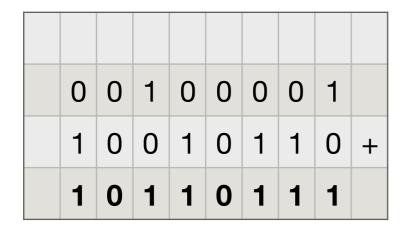


(6) Examples with Creating Overflow Bit



Exercises and Answers

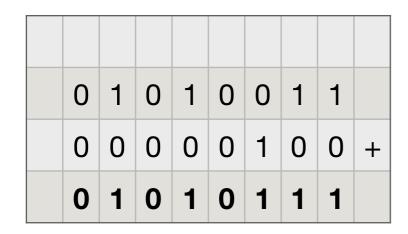
(1) Straight-forward addition



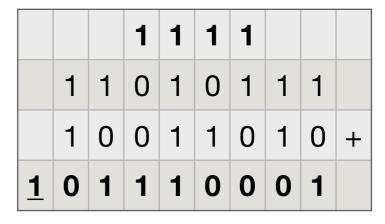
(4) Examples with Carrying

		1	1	1	1			
0	1	0	1	0	1	1	1	
1	0	0	1	1	0	1	0	+
1	1	1	1	0	0	0	1	

(2) Straight-forward addition



(5) Examples with Creating Overflow Bit



(3) Examples with Carrying

				1	1			
0	1	0	1	0	1	1	1	
0	0	0	0	0	0	1	0	+
0	1	0	1	1	0	0	1	

(6) Examples with Creating Overflow Bit

	1		1						
	1	1	0	1	0	0	0	1	
	1	1	0	1	1	0	1	0	+
<u>1</u>	1	0	1	0	1	0	1	1	