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## $n$ -bit adder

X84292\_en

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Design a circuit that performs the addition of two  $n$ -bit numbers. The result must be represented in  $n$  bits also. The number of bits  $n$  must be a parameter of the module.

### Specification

```
module adder (a, b, cin, sum, cout);  
    parameter N=16;  
    input [N-1:0] a, b;  
    input cin;  
    output [N-1:0] sum;  
    output cout;
```

### Hint

You may want to use several instances of a 1-bit full adder.

### Input

- $a$  and  $b$  are the two  $n$ -bit numbers.
- $cin$  is the input carry.

### Output

- $sum$  is the  $n$ -bit output representing  $(a + b) \bmod 2^n$ .
- $cout$  is the output carry.

### Problem information

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