課題11-4

プログラム

add4.v

```
module fa(a, b, ci, sum, co);
    input a, b, ci;
    output sum, co;
    assign { co, sum } = ci + a + b;
endmodule

module add4 ( a, b, ci, sum, co);
    input [3:0] a, b;
    input ci;
    output [3:0] sum;
    output co;
    wire [2:0] ca;

    fa f0(a[0], b[0], ci, sum[0], ca[0]);
    fa f1(a[1], b[1], ca[0], sum[1], ca[1]);
    fa f2(a[2], b[2], ca[1], sum[2], ca[2]);
    fa f3(a[3], b[3], ca[2], sum[3], co);
endmodule
```

実行結果

```
0000 + 0000 +(0) = 0000 ... carry=0
0000 + 0000 +(1) = 0001 ... carry=0
0000 + 0001 +(0) = 0001 ... carry=0
0000 + 0001 +(1) = 0010 ... carry=0
0001 + 0000 +(0) = 0001 ... carry=0
0001 + 0000 +(1) = 0010 ... carry=0
0001 + 0001 +(0) = 0010 ... carry=0
0001 + 0001 +(1) = 0011 ... carry=0
```

課題12-8

プログラム

sub.v

```
module sub( a, b, diff );
    input [3:0] a, b;
    output [3:0] diff;
    wire dummy; // coにダミーを接続

    // a-b = a + ~b + 1'b1
    add4 a1(a, ~b, 1'b1, diff, dummy);
endmodule
```

実行結果

```
0001 - 0000 = 0001
0001 - 0001 = 0000
0000 - 0000 = 0000
0000 - 0001 = 1111
```