



**Trinity College Dublin**  
Coláiste na Tríonóide, Baile Átha Cliath  
The University of Dublin

# 3C7 DIGITAL SYSTEM DESIGN LABORATORY

## Lab Session C

Department of Electronic and Electrical Engineering  
(e-Report submission)



### Lab:

1. Construct 6-bit ripple adder/subtractor

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## Lab – 6-bit ripple adder/subtractor

The given assignment starts with initialization of new project with the provided module. The provided module `full_adder` was used to setup another 6-bit adder module.

Now, the testbench was setup using previous template, finally the behavioural simulation was started.

```

6bit_ripple_tb.v  x  6bit_ripple_adder.v  x  full_adder.v  x  Untitled 3*  x
C:/Users/Rohan/Desktop/College/TCD/JS/S2/3C7/labC/6bit_ripple_tb.v

6      wire test_overflow;
7      wire test_cout;
8
9      ripple_adder uut (.x(test_in0),.y(test_in1),.sum(test_out),.sel(select),.overflow(test_overflow),.c_out(test_cout));
10
11      initial
12      begin
13
14          test_in0 = 6'b000001;
15          test_in1 = 6'b000100;
16          select = 0;
17          #200;
18          test_in0 = 6'b000000;
19          test_in1 = 6'b000000;
20          select = 0;
21          #200;
22          test_in0 = 6'b000000;
23          test_in1 = 6'b111111;
24          select = 1;
25          #200;
26          test_in0 = 6'b100001;
27          test_in1 = 6'b000001;
28          select = 0;
29          #200;
30          test_in0 = 6'b011111;
31          test_in1 = 6'b000001;
32          select = 1;
33          #200;
34          test_in0 = 6'b100000;
35          test_in1 = 6'b100000;
36          select = 0;
37          #200;

```

Figure 1.1. Testbench for the ripple adder module

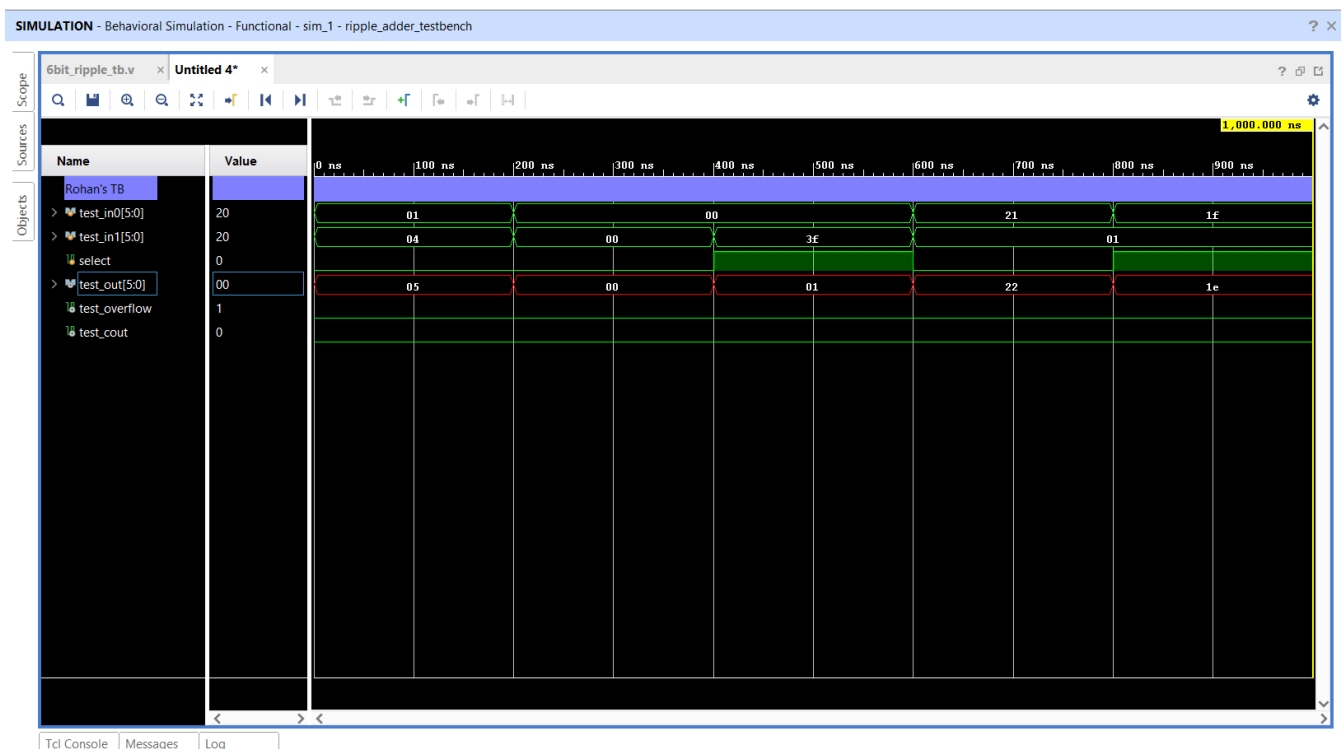


Figure 1.2. 6-bit ripple adder/subtractor simulation for the testbench

The test cases table:

Test ID	X	Y	Sel	Expected			Observed			Pass/Fail
				Cout	Overflow	Sum	Cout	Overflow	Sum	
1	6'b000001	6'b000100	0	0	0	6'b000101	0	0	6'b000101	Pass
2	6'b000000	6'b000000	0	0	0	6'b000000	0	0	6'b000000	Pass
3	6'b000000	6'b111111	1	0	0	6'b000001	0	0	6'b000001	Pass
4	6'b100001	6'b000001	0	0	0	6'b100010	0	0	6'b100010	Pass
5	6'b111111	6'b000001	1	0	0	6'b111110	0	0	6'b111110	Pass
6	6'b100000	6'b000001	0	0	1	6'b100001	0	1	6'b100001	Pass