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Full subtractor module:

A	B	B <sub>in</sub>	D	B <sub>out</sub>
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	0	1
1	0	0	1	0
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

AB \ B <sub>in</sub>	0	1
00		1
01	1	
11		1
10	1	

AB \ B <sub>in</sub>	0	1
00		1
01	1	1
11		1
10		

$$\begin{aligned}
 D &= A'B'B_{in} + A'BB_{in}' + AB'B_{in} + AB'B_{in}' \\
 &= A'(B'B_{in} + BB_{in}') + A(BB_{in} + B'B_{in}') \\
 &= A'(\underline{B_{in} \oplus B}) + A(\underline{B \oplus B_{in}})' \\
 &= A \oplus (B_{in} \oplus B) \\
 &= A \oplus B_{in} \oplus B
 \end{aligned}$$

$$\begin{aligned}
 B_{out} &= A'B'B_{in}' + BB_{in}' + A'B_{in}' \\
 &= A'(BB_{in}' + B_{in}') + BB_{in}' \\
 &= A'(B + B_{in}) + BB_{in}' \\
 &= A'B + AB_{in} + BB_{in}'
 \end{aligned}$$

Simulation:

```

source FullSubtractor4_tb.tcl
# set curr_wave [current_wave_config]
# if { [string length $curr_wave] == 0 } {
#   if { [llength [get_objects]] > 0 } {
#     add_wave /
#     set_property needs_save false [current_wave_config]
#   } else {
#     send_msg_id Add_Wave-1 WARNING "No top level signals found. Simulator will start without a wave window. If you want to open a wave window go to 'File->New Waveform'"
#   }
# }
# run 1000ns
Result for A = 1001, B = 0011, Bin = 1 : Diff = 0101, Bout = 0
Result for A = 0011, B = 0110, Bin = 1 : Diff = 1100, Bout = 1
INFO: [USF-XSim-96] XSim completed. Design snapshot 'FullSubtractor4_tb_behav' loaded.
INFO: [USF-XSim-97] XSim simulation ran for 1000ns
launch_simulation: Time (s): cpu = 00:00:00 ; elapsed = 00:00:06 . Memory (MB): peak = 3643.527 ; gain = 0.000

```