

CS223-1 Digital Design
LAB 2 Preliminary Report
Ege İpekci 21902333
24.04.2023

the half adder module in behavioral style

```
module halfadder( input logic a, b,  
output logic sum, Cout  
);  
assign sum = a ^ b;  
assign Cout = a & b;  
endmodule
```

```
//testbench  
module testbench();  
logic a,b, sum,Cout;  
halfadder dut( a, b , sum, Cout );  
initial begin a=0; b=0; #10;  
b=1; #10;  
a=1; b=0; #10; b=1;  
end  
endmodule
```

the half subtractor module in behavioral style

```
module halfsubtractor( input logic a, b, output logic D, Bout  
);  
assign D = a ^ b;  
assign Bout = ~a & b;  
endmodule
```

```
//testbench
module testbench();
logic a,b, D,Bout;
halfsubtractor dut( a, b , D,Bout );
initial begin a=0; b=0; #10;
b=1; #10;
a=1; b=0; #10; b=1;
end
endmodule
```

the full adder module in structural style

```
module OR( input logic a,b, output logic z );
assign z = a || b;
endmodule
```

```
module fulladder( input logic a, b,cin,
output logic sum, cout
);
logic s1,c1,s2,c2,
halfadder ha1(a,b, s1,c1);
halfadder ha2(s1,cin, sum,c2);
OR orgate1(c1, c2, cout);
endmodule
```

```
//testbench
```

```

module testbench(); logic a,b, Cin, sum,Cout;
fulladder uut( a, b , Cin, sum, Cout );
initial begin
a=0; b=0; Cin=0; #10; Cin=1; #10;
b=1; Cin=0; #10;
Cin=1; #10;
a=1; b=0; Cin=0; #10; Cin=1; #10;
b=1; Cin=0; #10;
Cin=1; #10;
end
endmodule

```

the full subtractor module in structural style

```

module OR( input logic a,b, output logic z );
assign z = a || b;
endmodule

```

```

module full_subtractor( input logic a, b, Bin, output logic D, Bout );

```

```

logic d1,b1,b2,d2;
halfsubtractor hs1(a,b, d1,b1);
halfsubtractor hs2(d1,Bin, D,b2);
OR orgate1(b1, b2, Bout);
Endmodule

```

```

//testbench

```

```
module testbench();  
logic a,b, Bin, D,Bout;  
full_subtractor uut( a, b , Bin, D, Bout );  
initial begin  
a=0; b=0; Bin=0; #10; Bin=1; #10;  
b=1; Bin=0; #10;  
Bin=1; #10;  
a=1; b=0; Bin=0; #10; Bin=1; #10;  
b=1; Bin=0; #10;  
Bin=1; #10;  
end  
endmodule
```