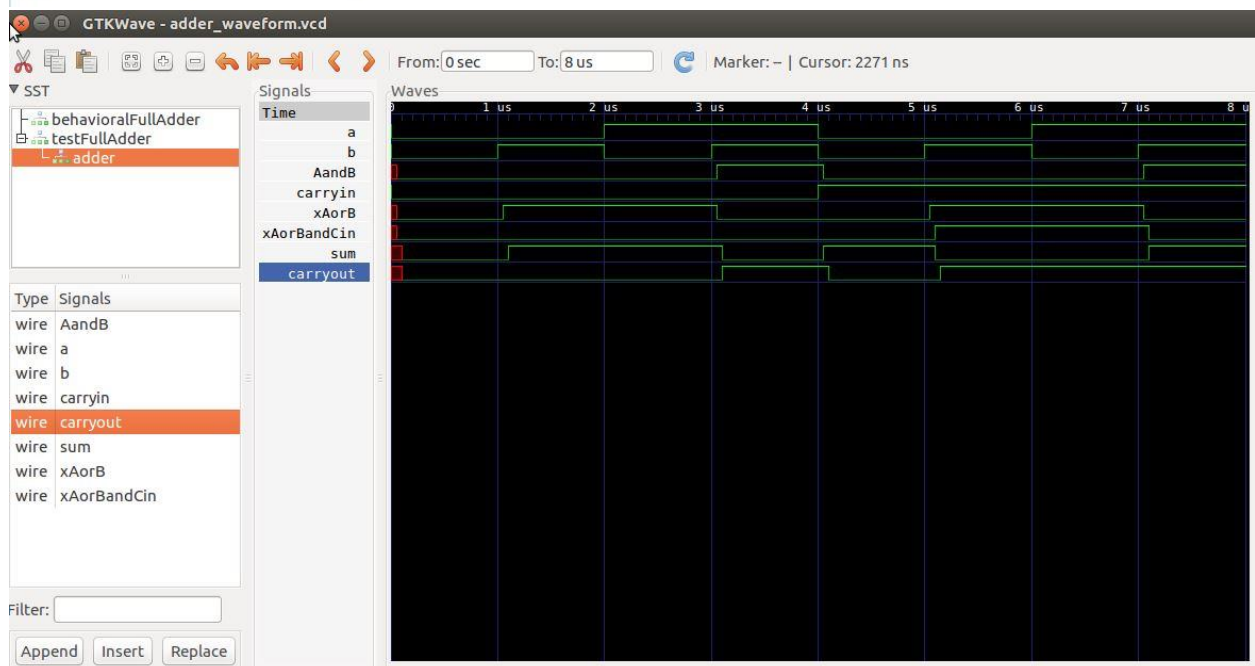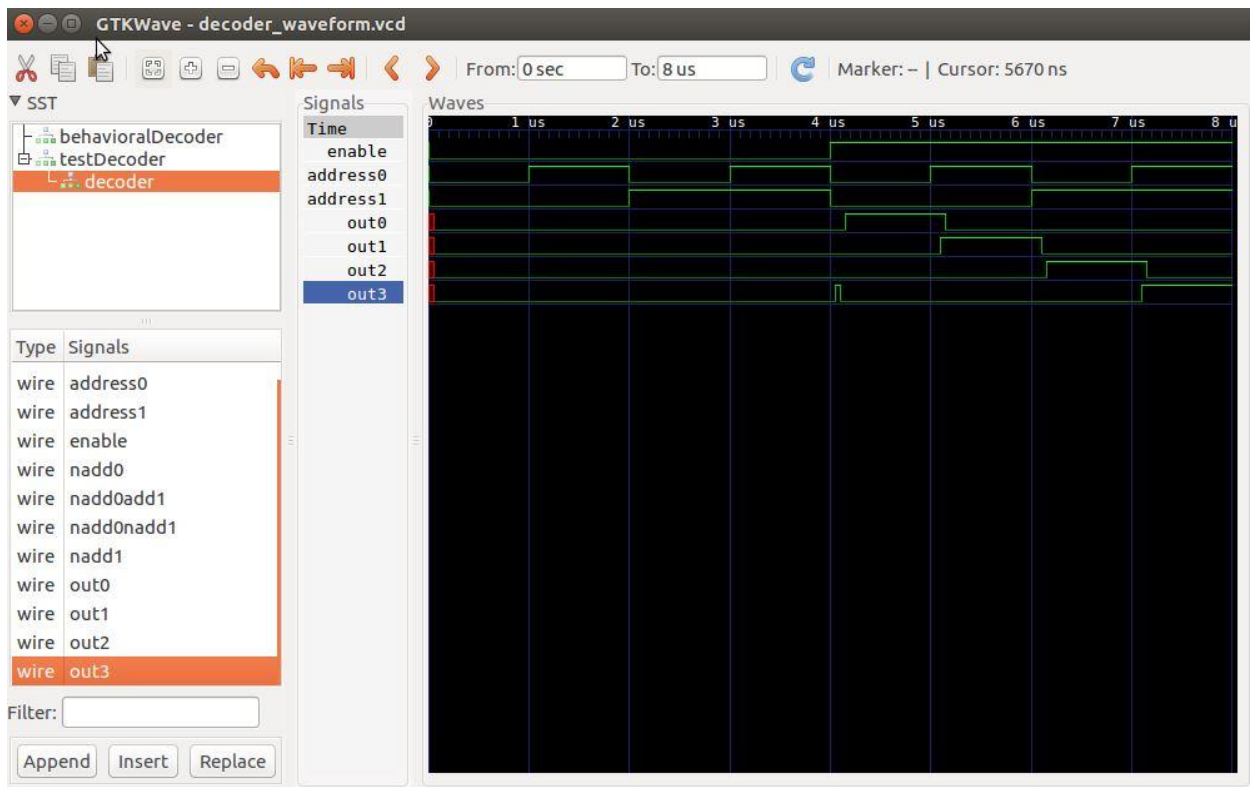# Lauren Pudvan
HW2

Adder

```
comparch@comparchVM:~/comparch/HW2$ iverilog -o adder adder.t.v
./adder.v:8: warning: timescale for behavioralFullAdder inherited from another file.
adder.t.v:2: ...: The inherited timescale is here.
./adder.v:20: warning: timescale for structuralFullAdder inherited from another file.
adder.t.v:2: ...: The inherited timescale is here.
comparch@comparchVM:~/comparch/HW2$ ./adder
a b carryin | sum carryout | Exp Sum Exp Cout
0 0   0     |  0    0       |    0       0
0 1   0     |  1    0       |    1       0
1 0   0     |  1    0       |    1       0
1 1   0     |  0    1       |    0       1
0 0   1     |  1    0       |    1       0
0 1   1     |  0    1       |    0       1
1 0   1     |  0    1       |    0       1
1 1   1     |  1    1       |    1       1
comparch@comparchVM:~/comparch/HW2$ gtkwave adder_waveform.vcd
```


The expected outputs match the actual outputs. The adder is adding the bits and providing a carryover if necessary!

Decoder

```
comparch@comparchVM:~/comparch/HW2$ iverilog -o decoder decoder.t.v
./decoder.v:7: warning: timescale for behavioralDecoder inherited from another file.
decoder.t.v:2: ...: The inherited timescale is here.
./decoder.v:18: warning: timescale for structuralDecoder inherited from another file.
decoder.t.v:2: ...: The inherited timescale is here.
comparch@comparchVM:~/comparch/HW2$ ./decoder
En A0 A1 | O0 O1 O2 O3 | Expected Output
0  0  0  | 0  0  0  0  | All false
0  1  0  | 0  0  0  0  | All false
0  0  1  | 0  0  0  0  | All false
0  1  1  | 0  0  0  0  | All false
1  0  0  | 1  0  0  0  | O0 only
1  1  0  | 0  1  0  0  | O1 only
1  0  1  | 0  0  1  0  | O2 only
1  1  1  | 0  0  0  1  | O3 only
comparch@comparchVM:~/comparch/HW2$ gtkwave decoder_waveform.vcd
```
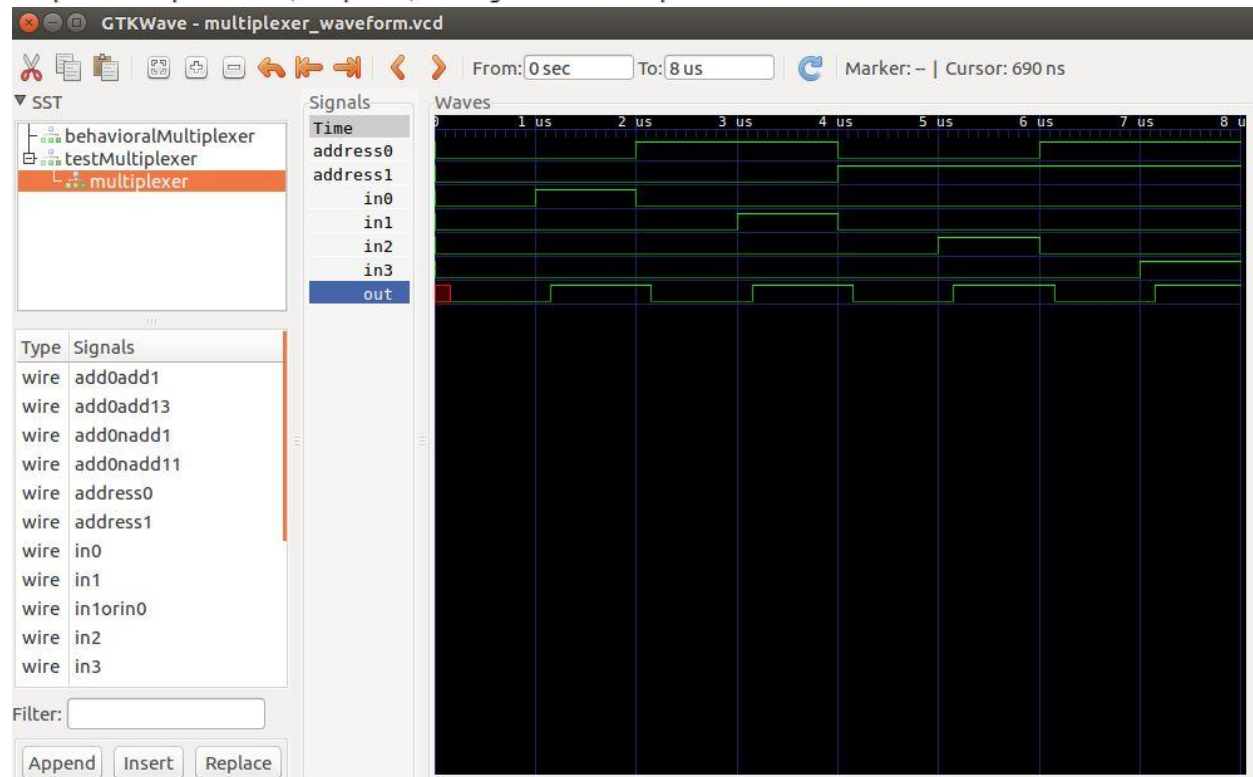

The expected outputs match the actual outputs. The decoder only outputs when enable is on. And it decodes what the binary number is by turning the respective output on.

Multiplexer

```
comparch@comparchVM:~/comparch/HW2$ iverilog -o multiplexer multiplexer.t.v
./multiplexer.v:7: warning: timescale for behavioralMultiplexer inherited from another file.
multiplexer.t.v:2: ...: The inherited timescale is here.
./multiplexer.v:20: warning: timescale for structuralMultiplexer inherited from another file.
multiplexer.t.v:2: ...: The inherited timescale is here.
comparch@comparchVM:~/comparch/HW2$ ./multiplexer
addr1 addr0| in0 in1 in2 in3 | output | Exp Out
   0    0  |  0   0   0   0  |   0    |   0
   0    0  |  1   0   0   0  |   1    |   1
   0    1  |  0   0   0   0  |   0    |   0
   0    1  |  0   1   0   0  |   1    |   1
   1    0  |  0   0   0   0  |   0    |   0
   1    0  |  0   0   1   0  |   1    |   1
   1    1  |  0   0   0   0  |   0    |   0
   1    1  |  0   0   0   1  |   1    |   1
comparch@comparchVM:~/comparch/HW2$ gtkwave multiplexer_waveform.vcd
```


The expected outputs match the actual outputs. The multiplexer uses the address (input) to decide which of the inputs is allowed to go through.