Adder:

A B	Cin	Cout	Sum	ExCout	ExSum
0 0	0	0	0	0	0
0 0	1	0	1	0	1
0 1	0	0	1	0	1
0 1	1	1	0	1	0
1 0	0	0	1	0	1
1 0	1	1	0	1	0
1 1	0	1	0	1	0
1 1	1	1	1	1	1

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

Multiplexer:

A0 A1	in0 in1 in2 in3	EX_OUT	Out
0 0	1 0 0 0	1	1
0 1	0 1 0 0	1	1
1 0	0 0 1 0	1	1
1 1	0 0 0 1	1	1
0 0	0 1 1 1	0	0
0 1	1 0 1 1	0	0
1 0	1 1 0 1	0	0
1 1	1 1 1 0	0	0