

Homework 4 Playing with Circuits

Due Date: Thursday February 28, 2008.

There is a possible 24 points for this homework.

Problem 1. (8 pts.) Draw a circuit using the “sum-of-products” algorithm whose output matches the following truth table:

a	b	c	out1	out2	out3
0	0	0	0	0	0
0	0	1	1	1	1
0	1	0	1	1	0
0	1	1	1	0	1
1	0	0	1	0	0
1	0	1	0	1	1
1	1	0	0	1	0
1	1	1	0	0	1

Problem 2. (10 pts. Even-parity circuit) Design an *even-parity* circuit. This is a circuit that has three inputs and one output. The circuit outputs a 1 if and only if an odd number (i.e. 1 or 3) of the inputs are a 1. Otherwise, the circuit outputs a 0. Thus the sum of the number of 1 bits in the input and output (i.e. that in each row the truth table) is always an even number. Provide a truth table in addition to your circuit.

Problem 3. (6 pts. Completeness) Using only AND and NOT gates provide a circuit that implements an OR circuit; a circuit with two inputs which outputs 0 if both inputs are 0, otherwise it outputs a 1.

Problem 4. (5 pts. Extra Credit) Implement an AND, OR and NOT circuit using either only nand gates or nor gates.