Sample Truth Table Problems
CS 353—Architecture and Compilers—Fritz Ruehr

For the first two problems, you can use one of the online truth table generators linked from the course homepage to check your work. (But we'll discuss them all later in class.)

1. Given the following truth table, compute the column (of 0s and 1s) corresponding to the formula given. You may wish to write a column below each operator, then work your way toward the "outermost" one (and). Here we'll use words for the operators, as in Python.

P	Q	R	(not (P or Q)) and (Q and (not R))
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

2. Now let's go the opposite direction (a bit harder!): given the following truth table, with a column specified, try to find a formula which will yield these results. It may not be easy to fit the formula literally in the space (box) given: depending on how you go about it, you might get something a bit too long.

P	Q	R	
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	1

3. We mentioned in class that we might use tables similar to truth tables, but with non-Booleans (i.e., a different number of values). Count the number of items in these situations:

    • with 5 possible values (inputs and outputs) and two variables (like P and Q): how many rows (combinations of inputs) and how many columns (different functions)?

    rows: _____   columns: _____

    • with 3 possible values and three variables (P, Q, R), how many rows and columns?

    rows: _____   columns: _____