

## II. One- and two-input logic operations

There are two distinct one-input logic operations and eight distinct two-input operations. The tables below show the output obtained by performing these operations on each possible bit-wise input. The bottom rows indicate the minimum number of nand computations required to perform each operation, proven through exhaustive search. To receive the reward for doing a particular logic function, a digital organism must return the correct values for an entire series of 32 bit-wise problems, including multiple examples of each possible combination of inputs.

1-Input			2-Input									
Input	Output		Input		Output							
A	ECHO	NOT	A	B	NAND	AND	OR_N*	OR	AND_N*	NOR	XOR	EQU
0	0	1	0	0	1	0	1	0	0	1	0	1
1	1	0	0	1	1	0	0	1	0	0	1	0
			1	0	1	0	1	1	1	0	1	0
			1	1	0	1	1	1	0	0	0	1
# nand	0	1	# nand		1	2	2	3	3	4	4	5

\* The order of the two inputs is arbitrary. Thus, the rewards for performing OR\_N and AND\_N are triggered by the reciprocal operations, in which A and B are reversed.

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