

Logic Circuit Analysis and Simplification

Given a circuit with inputs a, b, c , the logic operations are:

$$X = a \oplus b$$

$$Y = \overline{a \oplus b} = X'$$

$$f = \overline{X \oplus Y \oplus c}$$

Since $X \oplus X' = 1$, we simplify:

$$f = \overline{1 \oplus c} = \bar{\bar{c}} = c$$

Final Expression:

$$\boxed{f = c}$$

Truth Table

a	b	c	$f = c$
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

Raspberry Pi Pico Pin Connections

Signal	GPIO Pin	Purpose
<i>a</i>	GPIO 14	Push button input (pulled down)
<i>b</i>	GPIO 15	Push button input (pulled down)
<i>c</i>	GPIO 16	Push button input (pulled down)
<i>f</i>	GPIO 17	Output to LED

Note: Connect each button between the GPIO pin and 3.3V. Use internal pull-down resistors. Connect an LED (with resistor) from GPIO 17 to GND.