

Minterm Expression of $f(p, q, r) = pq + qr' + pr'$

Step 1: Truth Table

p	q	r	pq	qr'	pr'	$f = pq + qr' + pr'$
0	0	0	0	0	0	0
0	0	1	0	0	0	0
0	1	0	0	1	0	1
0	1	1	0	0	0	0
1	0	0	0	0	1	1
1	0	1	0	0	0	0
1	1	0	1	1	1	1
1	1	1	1	0	0	1

Step 2: Identify Rows Where $f = 1$

The function is true for the following combinations:

$$(0, 1, 0) \Rightarrow m_2 = p'qr'$$

$$(1, 0, 0) \Rightarrow m_4 = pq'r'$$

$$(1, 1, 0) \Rightarrow m_6 = pqr'$$

$$(1, 1, 1) \Rightarrow m_7 = pqr$$

Step 3: Canonical SOP (Minterm) Expression

$$f(p, q, r) = m_2 + m_4 + m_6 + m_7$$

Raspberry Pi Pico Pin Connections

Signal	GPIO Pin	Description
p	GPIO 15	Push button input with pull-down resistor
q	GPIO 16	Push button input with pull-down resistor
r	GPIO 14	Push button input with pull-down resistor
f (Output)	GPIO 17	Output to LED

Note: Connect push buttons between GPIO pins and 3.3V. Enable internal pull-down resistors. Connect LED (with resistor) from GPIO 17 to GND.