

# ASSIGNMENT

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## 1 Problem

Q.35. If  $X = X_1X_0$  and  $Y = Y_1Y_0$  are 2-bit binary numbers. The Boolean function  $S$  that satisfies the condition "If  $X > Y$ , then  $S = 1$ ", in its minimized form, is ?

1.  $X_1Y_1 + X_0Y_0$
2.  $X_1\overline{Y_1} + X_0\overline{Y_0}Y_1 + X_0\overline{Y_0}X_1$
3.  $X_1\overline{Y_1}x_0\overline{Y_0}$
4.  $X_1Y_1 + X_0\overline{Y_0}Y_1 + X_0\overline{Y_0}X_1$

## 2 Components

Component	Values	Quantity
ArduinoUNO		1
JumperWires	M-M	6
Breadboard		1
LED		5
Resistor	220ohms	5

## 3 Reduction of logical circuit

$$X = X_1X_0 \quad Y = Y_1Y_0$$

The boolean function  $S$  that satisfies the condition, if  $X > Y$ , then  $S = 1$ .

We can represent the above condition through a truth table.

$X$ $X_1X_0$	$Y$ $Y_1Y_0$	$S$ $X>Y$
0 0	0 0	0
0 0	0 1	0
0 0	1 0	0
0 0	1 1	0
0 1	0 0	1
0 1	0 1	0
0 1	1 0	0
0 1	1 1	0
1 0	0 0	1
1 0	0 1	1
1 0	1 0	0
1 0	1 1	0
1 1	0 0	1
1 1	0 1	1
1 1	1 0	1
1 1	1 1	0

Table 1: TRUTH TABLE FOR  $S = X>Y$

By using k-maps, we can find the boolean expression for the condition,  $S = 1$  if,  $X>Y$

		$Y_1Y_0$			
		00	01	11	10
$X_1X_0$	00	0	0	0	0
	01	1	0	0	0
	11	1	1	0	1
	10	1	1	0	0

Minimized form:  $S = X_1\overline{Y_1} + X_1X_0\overline{Y_0} + X_0\overline{Y_1}\overline{Y_0}$

## 4 Implementation

arduino		output
2	resistor	led 1 ( $X_1$ )
3	resistor	led 2 ( $X_0$ )
4	resistor	led 3 ( $Y_1$ )
5	resistor	led 4 ( $Y_0$ )
8	resistor	led 5 ( $S$ )

Table 2:

## 5 Procedure

1. Connect the circuit as per the above table.
2. The leds 1,2,3,4 represent the values of  $X_1, X_0, Y_1$  and  $Y_0$  respectively.
3. The led 5 represent  $S$ . if the condition  $X > Y$  is true.
4. Execute the circuits using the below code.

<https://github.com/saikiran-1309/FWC/blob/main/in-gate-2019-35/code/src/comp.cpp>