1. drawing the logic circuit diagram using Logisim,

Diagram, schematic

Description automatically generated2. furnishing the truth table of the logic circuit,

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| A1 | A0 | A | B1 | B0 | B | C3 | C2 | C1 | C0 | C |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 1 | 3 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 2 | 0 | 0 | 1 | 0 | 2 |
| 0 | 1 | 1 | 1 | 1 | 3 | 0 | 0 | 1 | 1 | 3 |
| 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 2 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 2 |
| 1 | 0 | 2 | 1 | 0 | 2 | 0 | 1 | 0 | 0 | 4 |
| 1 | 0 | 2 | 1 | 1 | 3 | 0 | 1 | 1 | 0 | 6 |
| 1 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 3 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 3 |
| 1 | 1 | 3 | 1 | 0 | 2 | 0 | 1 | 1 | 0 | 6 |
| 1 | 1 | 3 | 1 | 1 | 3 | 1 | 0 | 0 | 1 | 9 |

3. writing the Boolean function of each output variable

C0 = A0 B0

C1 = A0 B1 ^ A1 B0 or C1 = ~A0 A1 B0 + A1 B0 ~B1 + A0 ~A1 B1 + A0 ~B0 B1

C2 = A0 B1 A1 B0 ^ A1 B1 or C2 = ~A0 A1 B1 + A1 ~B0 B1

C3 = A0 B1 A1 B0 A1 B1 or C3 = A0 A1 B0 B1

4. explaining the possible usage of the logic circuits.

The use case of my circuit is multiplication. It multiplies inputs *A* with inputs *B* and outputs the product as *C*. This is good because you wouldn’t need to add *A* with *A*, *B* times to get the product. Also, you can’t just add *B* layers of addition to an already manufactured circuit. Instead, you can just use this circuit to find the product through manipulation logic. It’s kind of really cool.