**PROJECT 1: RGB Color Cipher**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Color** | **Z** | **Y** | **X** | **W** | **R** | **G** | **B** |
| **Cyan** | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| **Magenta** | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| **White** | 0 | 0 | 1 | 0 | 1 | 1 | 1 |
| **Blue** | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| **Off** | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| **Yellow** | 0 | 1 | 0 | 1 | 1 | 1 | 0 |
| **Red** | 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| **Green** | 0 | 1 | 1 | 1 | 0 | 1 | 0 |
| **Off** | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Yellow** | 1 | 0 | 0 | 1 | 1 | 1 | 0 |
| **White** | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| **Cyan** | 1 | 0 | 1 | 1 | 0 | 1 | 1 |
| **X** | 1 | 1 | 0 | 0 | X | X | X |
| **X** | 1 | 1 | 0 | 1 | X | X | X |
| **X** | 1 | 1 | 1 | 0 | X | X | X |
| **X** | 1 | 1 | 1 | 1 | X | X | X |

**Truth Table**

**K-Maps**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ZY\XW** | **00** | **01** | **11** | **10** |
| **00** | 0 | 1 | 0 | 1 |
| **01** | 0 | 1 | 0 | 1 |
| **11** | X | X | X | X |
| **10** | 0 | 1 | 0 | 1 |

Red

Loop 1: !XW

Loop 2: X!W

**!XW + X!W = X (XOR) W**

**1 XOR**

Blue

Loop 1: !Z!Y!X!W+!Z!Y!ZW+!Z!YXW+!Z!YX!W =**!Z!Y = !(Y+Z)**

Loop 2: Z!YXW+Z!YX!W+ZYXW+ZYX!W = **XZ  
  
!(Y+Z) + XZ**

**1 NOR 1 OR 1 AND**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ZY\XW** | **00** | **01** | **11** | **10** |
| **00** | 1 | 1 | 1 | 1 |
| **01** | 0 | 0 | 0 | 0 |
| **11** | X | X | X | X |
| **10** | 0 | 0 | 1 | 1 |

Green

i still don’t really understand this math lol

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ZY\XW** | **00** | **01** | **11** | **10** |
| **00** | 1 | 0 | 0 | 1 |
| **01** | 0 | 1 | 1 | 0 |
| **11** | X | X | X | X |
| **10** | 0 | 1 | 1 | 1 |

!Z!Y!W + !ZYW + ZW +ZX

!Z(!Y!W+YW)+Z(W+X)

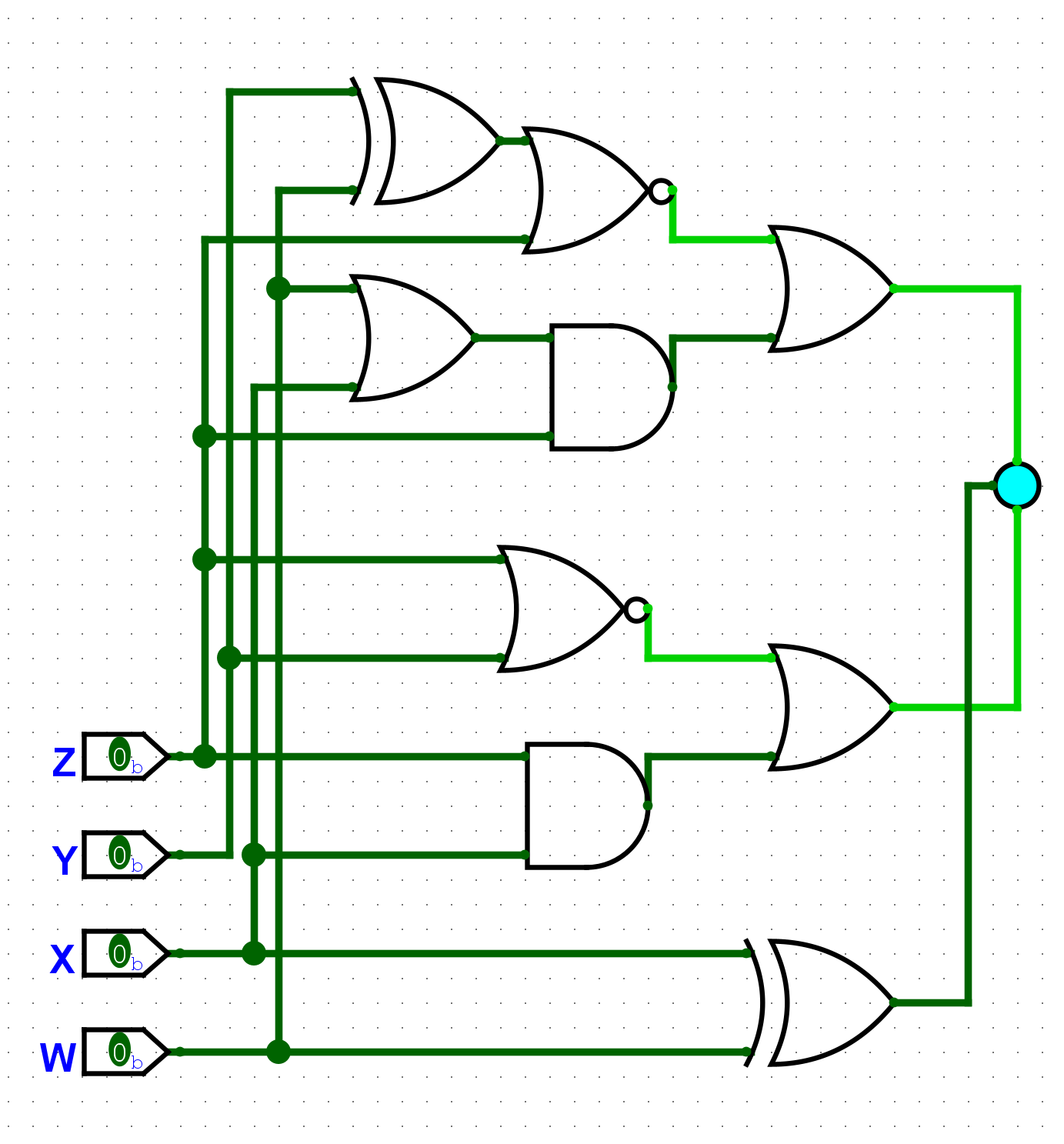
!Z!(W XOR Y)+Z(W+X)

**!(Z+(W XOR Y)) +Z(W+X)**

**1 AND, 2 OR, 1 NOR, 1 XOR**

**Logisim**



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