**EXAM 1**

A computer architecture and organization exam

Description automatically generated

**Honor code: I have neither given nor received unauthorized aid in completing this work. – May Wandyez**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **5(10)** | **0** | **1** | **0** | **1** |
| **3(10)** | **0** | **0** | **1** | **1** |
| **Two’s Complement 3(10)** | **1** | **1** | **0** | **1** |
| **Result** | **0** | **0** | **1** | **0** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **3(10)** | **0** | **0** | **1** | **1** |
| **5(10)** | **0** | **1** | **0** | **1** |
| **Two’s Complement 5(10)** | **1** | **0** | **1** | **1** |
| **Result (add the complement and the 3(10) discard leftmost carry forward)** | **1** | **1** | **1** | **0** |

A table with numbers and symbols

Description automatically generated

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **W** | **X** | **Y** | **Z** | **W’ XY** | **WZ** | **W’+Z** | **W+XY** | **(W’+Z)(W+XY)** |
| **0** | **0** | **0** | **0** | **0** | **0** | **1** | **0** | **0** |
| **0** | **0** | **0** | **1** | **0** | **0** | **1** | **0** | **0** |
| **0** | **0** | **1** | **0** | **0** | **0** | **1** | **0** | **0** |
| **0** | **0** | **1** | **1** | **0** | **0** | **1** | **0** | **0** |
| **0** | **1** | **0** | **0** | **0** | **0** | **1** | **0** | **0** |
| **0** | **1** | **0** | **1** | **0** | **0** | **1** | **0** | **0** |
| **0** | **1** | **1** | **0** | **1** | **0** | **1** | **1** | **1** |
| **0** | **1** | **1** | **1** | **1** | **0** | **1** | **1** | **1** |
| **1** | **0** | **0** | **0** | **0** | **0** | **0** | **1** | **0** |
| **1** | **0** | **0** | **1** | **0** | **1** | **1** | **1** | **1** |
| **1** | **0** | **1** | **0** | **0** | **0** | **0** | **1** | **0** |
| **1** | **0** | **1** | **1** | **0** | **1** | **1** | **1** | **1** |
| **1** | **1** | **0** | **0** | **0** | **0** | **0** | **1** | **0** |
| **1** | **1** | **0** | **1** | **0** | **1** | **1** | **1** | **1** |
| **1** | **1** | **1** | **0** | **0** | **0** | **0** | **1** | **0** |
| **1** | **1** | **1** | **1** | **0** | **1** | **1** | **1** | **1** |

A black and blue text

Description automatically generated

**F = ((A’+B)’ B)’ C + B**

**Demorgan’s theorem**

**F = (AB’B)’ C + B**

**B and not B is always equals to 0**

**This is then inverted to always equals 1, but C is still required for the AND**

**F = C + B**

**DON”T FORGET TO DO THESE**



**G = ((AB)’(B+C))’ C**

**Demorgan’s Theorem**

**((AB)’’ +(B+C)’ )C**

**(AB+(B+C)’) C**

**(AB+B’C’)C**

**ABC + BCC’**

**G = ABC**

A math equation with black text

Description automatically generated

**000,001,010,101,110,111**

**Sum of Product Expression:**

**Y = A’B’C’ + A’B’C + A’BC’+AB’C+ABC’+ABC**

**Y = A’B’(C+C’) +A’BC’+AB’C + AB(C+C’)**

**Y = A’B’ + AB + A’BC’+AB’C**

**Y = AB+A’(B’+BC’)+AB’C**

**AB+A’(B’+C) + AB’C**

**A’(B+C) + A(B+B’C)**

**Y = A’(B+C) + A(B+C)**

**Hrm I don’t think I did that algebra right.**

A red marker drawing of a grid

Description automatically generated A drawing of a graph

Description automatically generated A drawing of a graph

Description automatically generated

**Y = (A XNOR B) + A’BC’+AB’C**

**Y = (A XNOR B) + (A XNOR C)**

A diagram of a circuit diagram

Description automatically generated

A diagram of a number

Description automatically generated

A drawing of a rocket

Description automatically generated

**EQUATION IS TYPED AS: (AB) NOR (B)**

**When B is zero, output is one. Effectively the gate is NOT B.**

**Truth Table:**

|  |  |  |  |
| --- | --- | --- | --- |
| **FA** | **FB** | **AB** | **FOUT** |
| **0** | **0** | **0** | **1** |
| **0** | **1** | **0** | **0** |
| **1** | **0** | **0** | **1** |
| **1** | **1** | **1** | **0** |

A close-up of a diagram

Description automatically generated

**There are 7 months having 31 days, January 1 0001, March 3 0011, May 5 0101, July 7 0111, August 8 1000, October 10 1010, December 12 1100,**

A drawing of a red and blue grid

Description automatically generated A drawing of a red line

Description automatically generated

**Used a Karnaugh map to figure out how to actually write the equation**

**Equation = AC’D’ + A’D**

A drawing of a diagram

Description automatically generated

**3 Gates is fairly few (well 4 if you break down the AND gate into the number of gates the transistor actually needs).**

A black text on a white background

Description automatically generated

**N>= 3 -> 1, N<3 ->0**

**Truth Table:**

|  |  |  |  |
| --- | --- | --- | --- |
| **A** | **B** | **C** | **F** |
| **0** | **0** | **0** | **0** |
| **0** | **0** | **1** | **0** |
| **0** | **1** | **0** | **0** |
| **0** | **1** | **1** | **1** |
| **1** | **0** | **0** | **1** |
| **1** | **0** | **1** | **1** |
| **1** | **1** | **0** | **1** |
| **1** | **1** | **1** | **1** |

**Minterms:**

**F= A’BC + AB’C’+AB’C+ABC’+ABC**

**F = BC(A’+A) + AB’C+AB’C +ABC’**

**BC+ AB’(C’+C) + ABC’**

**BC+AB’+ABC’**

**B(C+AC’) + AB’**

**AB’+B(A+C)**

**AB’+AB+BC**

**A(B+B’)+BC**

**F = A+BC**

**F= A+BC**

**Karnaugh Map:**

A drawing of a number and a number

Description automatically generated with medium confidence

**F=A+BC**

**Circuit Diagram:**

A red line drawing of a rocket

Description automatically generated

A diagram of a circuit

Description automatically generated

A diagram of a circuit

Description automatically generated

A diagram of a diagram

Description automatically generated

A diagram of a diagram

Description automatically generated

A diagram of a circuit

Description automatically generated

A diagram of a circuit

Description automatically generated

**Table B seems to match.**

**I’m confused, easier to make a truth table to check:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Z** | **Z’** | **Y** | **Multiplexer 1 output** | **NOT multiplexer one output** | **X** | **Multiplexer 2 output** |
| **0** | **1** | **0** | **0** | **1** | **0** | **0** |
| **0** | **1** | **0** | **0** | **1** | **1** | **1** |
| **0** | **1** | **1** | **1** | **0** | **0** | **1** |
| **0** | **1** | **1** | **1** | **0** | **1** | **0** |
| **1** | **0** | **0** | **1** | **0** | **0** | **1** |
| **1** | **0** | **0** | **1** | **0** | **1** | **0** |
| **1** | **0** | **1** | **0** | **1** | **0** | **0** |
| **1** | **0** | **1** | **0** | **1** | **1** | **1** |

**Remember for multiplexers, if S is 0, then the upper output is selected, otherwise the lower one is.**