**Assignment #4.01 – Logical Expressions, Part II**

Due: TBA - see gwss.edu20.org

**Part A: Convert the following Schematic Diagrams into Boolean Expressions**

|  |  |
| --- | --- |
| 1. Schematic | Expression: |
|  | =x |

|  |  |
| --- | --- |
| 1. Schematic | Expression: |
|  | + = x |

|  |  |
| --- | --- |
| 1. Schematic | Expression: |
|  | =x |

|  |  |
| --- | --- |
| 1. Schematic | Expression: |
|  | = x |

|  |  |
| --- | --- |
| 1. Schematic | Expression: |
|  | = x |

|  |  |
| --- | --- |
| 1. Schematic | Expression: |
|  | ( ) + = x |

=

|  |  |
| --- | --- |
| 1. Schematic | Expression: |
|  | (a ⊕ b) + (a \* c) = x |

|  |  |
| --- | --- |
| 1. Schematic | Expression: |
|  | = x |

|  |  |
| --- | --- |
| 1. Schematic | Expression: |
|  | = x |

|  |  |
| --- | --- |
| 1. Schematic | Expression: |
|  | (( A \* b ) + ) ⊕ (c+d) = x |

|  |  |
| --- | --- |
| 1. Schematic | Expression: |
|  | = x |

|  |  |
| --- | --- |
| 1. Schematic | Expression: |
|  | A \*( \* c) = x |

**Part 2: Using truth tables, determine if the following circuits diagrams are equivalent.**

|  |  |  |
| --- | --- | --- |
|  | Circuit #1 | Circuit #2 |
|  |  |  |
|  | |  |  |  | | --- | --- | --- | | A | B | Y | | 0 | 0 | 0 | | 1 | 0 | 1 | | 0 | 1 | 1 | | 1 | 1 | 1 | | |  |  |  | | --- | --- | --- | | A | B | Y | | 0 | 0 | 0 | | 1 | 0 | 1 | | 0 | 1 | 1 | | 1 | 1 | 1 | |
|  | Boolean Expression:  A+B =Y | Boolean Expression:  B+A=Y |

|  |  |  |
| --- | --- | --- |
|  | Circuit #1 | Circuit #2 |
|  |  |  |
|  | |  |  |  | | --- | --- | --- | | A | B | Y | | 0 | 0 | 0 | | 0 | 1 | 0 | | 1 | 0 | 0 | | 1 | 1 | 1 | | |  |  |  | | --- | --- | --- | | B | A | Y | | 0 | 0 | 0 | | 1 | 1 | 1 | | 1 | 0 | 0 | | 0 | 1 | 0 | |
|  | Boolean Expression:  A\*B=Y | Boolean Expression:  B\*A=Y |

|  |  |  |
| --- | --- | --- |
|  | Circuit #1 | Circuit #2 |
|  |  |  |
|  | |  |  |  |  |  | | --- | --- | --- | --- | --- | | **A** | **B** | **C** | **X** | **Y** | | 0 | 0 | 0 | 0 | 0 | | 1 | 0 | 0 | 1 | 1 | | 0 | 1 | 0 | 1 | 1 | | 0 | 0 | 1 | 0 | 1 | | 1 | 1 | 0 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | | 0 | 1 | 1 | 1 | 1 | | 1 | 0 | 1 | 1 | 1 | | |  |  |  |  |  | | --- | --- | --- | --- | --- | | **A** | **B** | **C** | **X** | **Y** | | 0 | 0 | 0 | 0 | 0 | | 1 | 1 | 1 | 1 | 1 | | 1 | 0 | 0 | 0 | 1 | | 0 | 1 | 0 | 1 | 1 | | 0 | 0 | 1 | 1 | 1 | | 1 | 1 | 0 | 1 | 1 | | 0 | 1 | 1 | 1 | 1 | | 1 | 0 | 1 | 1 | 1 | |
|  | Boolean Expression:  (A+B)+C=Y | Boolean Expression:  (C+B)+A=Y |

|  |  |  |
| --- | --- | --- |
|  | Circuit #1 | Circuit #2 |
|  |  |  |
|  | |  |  |  |  |  | | --- | --- | --- | --- | --- | | **A** | **B** | **C** | **X** | **Y** | | 0 | 0 | 0 | 0 | 0 | | 1 | 1 | 1 | 1 | 1 | | 1 | 0 | 0 | 0 | 0 | | 0 | 1 | 0 | 0 | 0 | | 0 | 0 | 1 | 0 | 0 | | 1 | 1 | 0 | 1 | 0 | | 0 | 1 | 1 | 0 | 0 | | 1 | 0 | 1 | 0 | 0 | | |  |  |  |  |  | | --- | --- | --- | --- | --- | | **A** | **B** | **C** | **X** | **Y** | | 0 | 0 | 0 | 0 | 0 | | 1 | 1 | 1 | 1 | 1 | | 1 | 0 | 0 | 0 | 0 | | 0 | 1 | 0 | 0 | 0 | | 0 | 0 | 1 | 0 | 0 | | 1 | 1 | 0 | 0 | 0 | | 0 | 1 | 1 | 1 | 0 | | 1 | 0 | 1 | 0 | 0 | |
|  | Boolean Expression:  (A\*B)\*C=Y | Boolean Expression:  (C\*B)\*A=Y |

|  |  |  |
| --- | --- | --- |
|  | Circuit #1 | Circuit #2 |
|  |  |  |
|  | |  |  |  |  |  | | --- | --- | --- | --- | --- | | **A** | **B** | **C** | **X** | **Y** | | 0 | 0 | 0 | 0 | 0 | | 1 | 1 | 1 | 1 | 1 | | 1 | 0 | 0 | 0 | 0 | | 0 | 1 | 0 | 1 | 0 | | 0 | 0 | 1 | 1 | 0 | | 1 | 1 | 0 | 1 | 1 | | 0 | 1 | 1 | 1 | 0 | | 1 | 0 | 1 | 1 | 1 | | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **A** | **B** | **C** | **X** | **W** | **Y** | | 1 | 1 | 1 | 1 | 1 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | | 0 | 1 | 0 | 0 | 0 | 0 | | 0 | 0 | 1 | 0 | 0 | 0 | | 1 | 1 | 0 | 1 | 0 | 0 | | 1 | 0 | 1 | 0 | 1 | 0 | | 0 | 1 | 1 | 0 | 0 | 0 | |
|  | Boolean Expression:  (B+C)\*A = Y | Boolean Expression:  (A\*B)+(A\*C)=Y |

|  |  |  |
| --- | --- | --- |
|  | Circuit #1 | Circuit #2 |
|  |  |  |
|  | |  |  |  |  |  | | --- | --- | --- | --- | --- | | **A** | **B** | **C** | **X** | **Y** | | 0 | 0 | 0 | 0 | 0 | | 1 | 1 | 1 | 1 | 1 | | 1 | 0 | 0 | 0 | 1 | | 0 | 1 | 0 | 0 | 0 | | 0 | 0 | 1 | 0 | 0 | | 0 | 1 | 1 | 1 | 1 | | 1 | 1 | 0 | 0 | 1 | | 1 | 0 | 1 | 0 | 1 | | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **A** | **B** | **C** | **X** | **W** | **Y** | | 1 | 0 | 0 | 1 | 1 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | | 1 | 1 | 1 | 1 | 1 | 1 | | 0 | 1 | 0 | 1 | 0 | 1 | | 0 | 0 | 1 | 0 | 1 | 1 | | 0 | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 0 | 1 | 1 | 1 | | 1 | 0 | 1 | 1 | 1 | 1 | |
|  | Boolean Expression:  (B\*C)+A=Y | Boolean Expression:  (A+B)\*(A+C)=Y |

|  |  |  |
| --- | --- | --- |
|  | Circuit #1 | Circuit #2 |
|  |  |  |
|  | |  |  |  | | --- | --- | --- | | A | B | Y | | 0 | 0 | 1 | | 0 | 1 | 0 | | 1 | 0 | 0 | | 1 | 1 | 0 | | |  |  |  | | --- | --- | --- | | A | B | Y | | 0 | 0 | 1 | | 1 | 1 | 0 | | 0 | 1 | 0 | | 1 | 0 | 0 | |
|  | Boolean Expression:  (AB)=Y | Boolean Expression:  \*=Y |

|  |  |  |
| --- | --- | --- |
|  | Circuit #1 | Circuit #2 |
|  |  |  |
|  | |  |  |  | | --- | --- | --- | | A | B | Y | | 0 | 0 | 1 | | 1 | 1 | 0 | | 1 | 0 | 1 | | 0 | 1 | 1 | | |  |  |  | | --- | --- | --- | | A | B | Y | | 0 | 0 | 1 | | 1 | 1 | 0 | | 1 | 0 | 1 | | 0 | 1 | 1 | |
|  | Boolean Expression:  (AB)=Y | Boolean Expression:  +=Y |