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

Due: TBA - see gwss.edu20.org

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

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| --- | --- |
| 1. Schematic | Expression: |
|  | \_\_\_\_\_  A+B = X |

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| 1. Schematic | Expression: |
|  | \_ \_  A+B=X |

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| 1. Schematic | Expression: |
|  | \_\_\_\_\_  A⊕ B = X |

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| 1. Schematic | Expression: |
|  | \_ \_  A⊕ B= X |

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| 1. Schematic | Expression: |
|  | \_  A+A=X |

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| 1. Schematic | Expression: |
|  | \_\_\_\_\_\_ \_\_  (A⊕ B) + C = X |

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| 1. Schematic | Expression: |
|  | (A\*C) + (A⊕ B) = X |

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| 1. Schematic | Expression: |
|  | \_  A\*A=X |

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| 1. Schematic | Expression: |
|  | \_\_\_\_\_\_\_\_\_\_\_  \_  (A+B)\*(C\*D)=X |

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| 1. Schematic | Expression: |
|  | \_  ((A\*B)+C) ⊕ (C+D)=X |

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| 1. Schematic | Expression: |
|  | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_  (A\*(B\*C)) \* (A⊕ D) = X |

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| 1. Schematic | Expression: |
|  | \_\_\_\_  A\*((A+B)\*C) = X |

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

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

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

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

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

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

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

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

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| --- | --- | --- |
|  | 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 | 0 | 1 | | 0 | 1 | 1 | | 1 | 1 | 0 | |
|  | Boolean Expression:  \_\_\_\_\_  A \* B = Y | Boolean Expression:  \_ \_  A + B = Y |