Name and Student ID: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Lab Section: \_\_\_

Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**PRELAB:**

Read the Mini-Project lab document and complete as much of this answer sheet as you can before lab.

**TA Initials: \_\_\_\_\_\_\_\_\_\_\_**

**LAB:**

**4.0** Draw Uncle Bob’s circuit below, using only AND, OR, and NOT gates.

**5.0** Give the shorthand canonical SOP expression for Uncle Bob’s circuit and then the Verilog code which implements this behavior:

**B(W, X, Y, Z)**  **=** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Verilog:**

Demonstration of Quartus Results:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**6.0** Truth table for Uncle Bob’s function B and the 4-bit prime detector function P.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **W** | **X** | **Y** | **Z** | **B** | **P** |
| 0 | 0 | 0 | 0 |  |  |
| 0 | 0 | 0 | 1 |  |  |
| 0 | 0 | 1 | 0 |  |  |
| 0 | 0 | 1 | 1 |  |  |
| 0 | 1 | 0 | 0 |  |  |
| 0 | 1 | 0 | 1 |  |  |
| 0 | 1 | 1 | 0 |  |  |
| 0 | 1 | 1 | 1 |  |  |
| 1 | 0 | 0 | 0 |  |  |
| 1 | 0 | 0 | 1 |  |  |
| 1 | 0 | 1 | 0 |  |  |
| 1 | 0 | 1 | 1 |  |  |
| 1 | 1 | 0 | 0 |  |  |
| 1 | 1 | 0 | 1 |  |  |
| 1 | 1 | 1 | 0 |  |  |
| 1 | 1 | 1 | 1 |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 00 | 01 | 11 | 10 |
| 00 |  |  |  |  |
| 01 |  |  |  |  |
| 11 |  |  |  |  |
| 10 |  |  |  |  |

P

wx

wx

yz

Simplified SOP Expression:

**P(W, X, Y, Z)** **=** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**7.0** Give your implementation of the correct 4-bit prime detector circuit (**P**) below as either Verilog or a schematic (your choice). Then demonstrate the results:

Demonstration of ModelSim Results:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**8.0** Design and implement a circuit that uses Uncle Bob’s circuit but fixes his mistakes. Draw it below and demonstrate the results:

Demonstration of ModelSim Results:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_