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

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

**PRELAB:**

**Q1.** Before you fill in the answers to this prelab make sure that you understand binary arithmentic, especially signed number representation (2’s Complement) and overflow in arithmetic addition and subtraction Do the following arithmetic operations and write down the expected sum, carry and overfow:

*In case of subtraction, since we are doing a 2’s Complement addition Cout is the carryout of the adder.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Binary numbers to add/subtract** | **Sum** | **Cout** | **Overflow** |
| **1011 – 0110** | **0101** | **1** | **1** |
| **1001 - 0010** | **0111** | **1** | **1** |
| 0001 + 0111 |  |  |  |
| 1100 + 0110 |  |  |  |
| 0011 – 1101 |  |  |  |
| 0101 + 1011 |  |  |  |

**Q2.** Complete the truth table for a full adder:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **X** | **Y** | **Cin** | **Cout** | **S** |
| 0 | 0 | 0 |  |  |
| 0 | 0 | 1 |  |  |
| 0 | 1 | 0 |  |  |
| 0 | 1 | 1 |  |  |
| 1 | 0 | 0 |  |  |
| 1 | 0 | 1 |  |  |
| 1 | 1 | 0 |  |  |
| 1 | 1 | 1 |  |  |

**Q3.** Complete the assignment expressions for S and Cout below:

module FA (Cin, X, Y, S, Cout);

input Cin, X, Y;

output Cout, S;

assign S = (**expression for S**);

assign Cout = (**expression for Cout**);

Expression for S:

Expression for Cout:

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

**LAB:**

Hardware demonstrates a good circuit. TA Initials: \_\_\_\_\_\_\_\_\_