CSIS 3740 – Project 2 Handout

Learning Objectives:

- Apply Boolean algebra rules (truth tables, simplification).
- Implement digital circuits in code (half adder, full adder, multiplexer).
- Connect logic design to arithmetic operations.

Background:

In lecture, we discussed Boolean algebra laws and simple circuits. This project bridges theory and practice by asking you to implement Boolean expressions, verify truth tables, and build simple digital components in C++ code.

Tasks:

- Implement a Boolean expression evaluator: Input: truth table or Boolean formula. Output: simplified expression using algebraic rules.
- Code basic digital circuits: Half adder (A, B $\rightarrow$ Sum, Carry); Full adder (A, B, Cin $\rightarrow$ Sum, Cout); 2:1 multiplexer (A, B, Sel $\rightarrow$ Y).
- Demonstrate results with test cases: Verify truth tables for each component. Show simplification examples.

Deliverables:

- Source code with Makefile.
- REPORT.md/PDF with explanation of Boolean simplification steps, truth tables, and example outputs.
- Screenshots/logs of execution.

Rubric (100 points):

Criterion	Points
Boolean simplification & correctness	40
Circuit implementation (adder/mux)	40
Report clarity & tables	10
Code style & readability	10