

THE UNIVERSITY OF AZAD JAMMU & KASHMIR, MUZAFFARABAD



COURSE TITLE

CALD

COURSE CODE

CS-1205

LAB TITLE

ADDER-SUBTRACTOR

STUDENT NAME

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STUDENT ROLL NUMBER

2024-SE-31

INSTRUCTOR NAME

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SUBMISSION DATE

AUG 09, 2025

DEPARTMENT OF SOFTWARE ENGINEERING

CALD

Lab 6

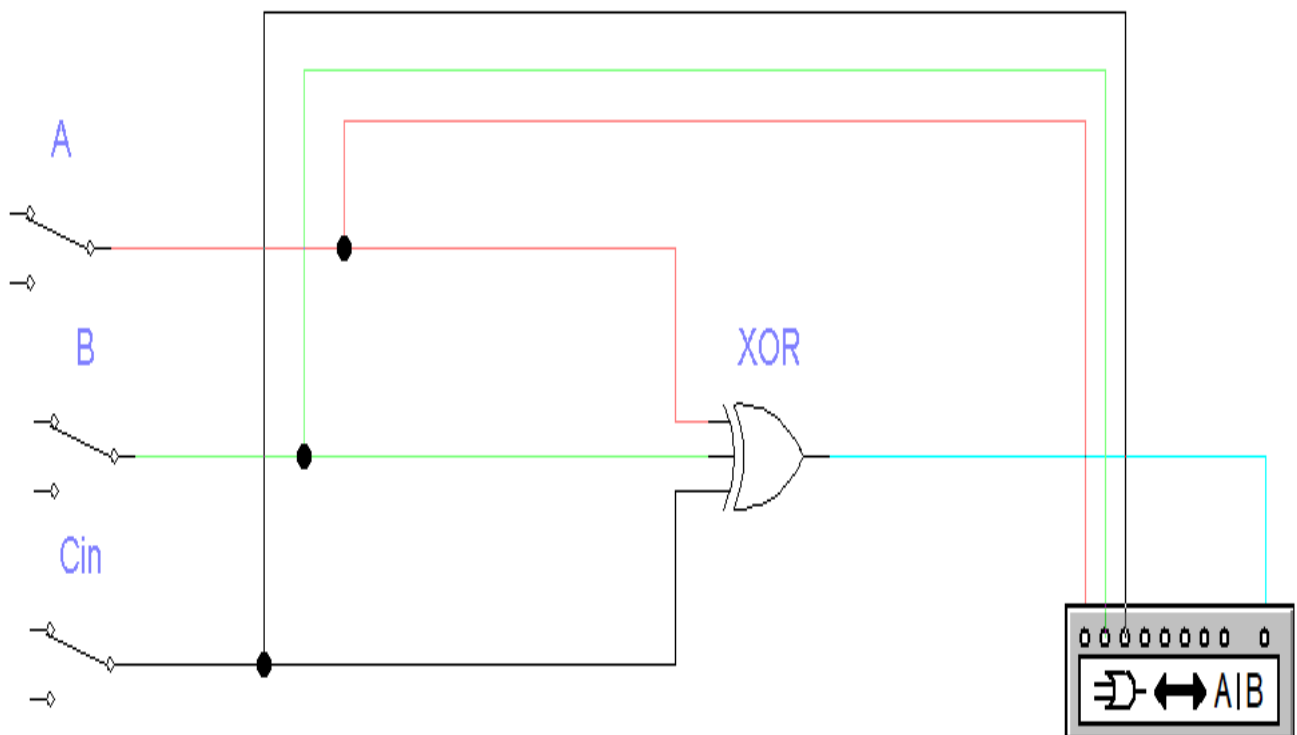
Objective:

This experiment aims to demonstrate the working of the full adder as well as the working of half subtractor.

Experiment on EWB

Full Adder Using Logic Gates

Sum Output



Truth Table

Logic Converter

Out ☐

	A	B	C	D	E	F	G	H
000	0	0	0					0
001	0	0	1					1
002	0	1	0					0
003	0	1	1					1
004	1	0	0					0
005	1	0	1					1
006	1	1	0					0
007	1	1	1					1

Conversions

\Rightarrow \rightarrow $\overline{101}$

$\overline{101} \rightarrow A/B$

$\overline{101} \xrightarrow{\text{SIMP}} A/B$

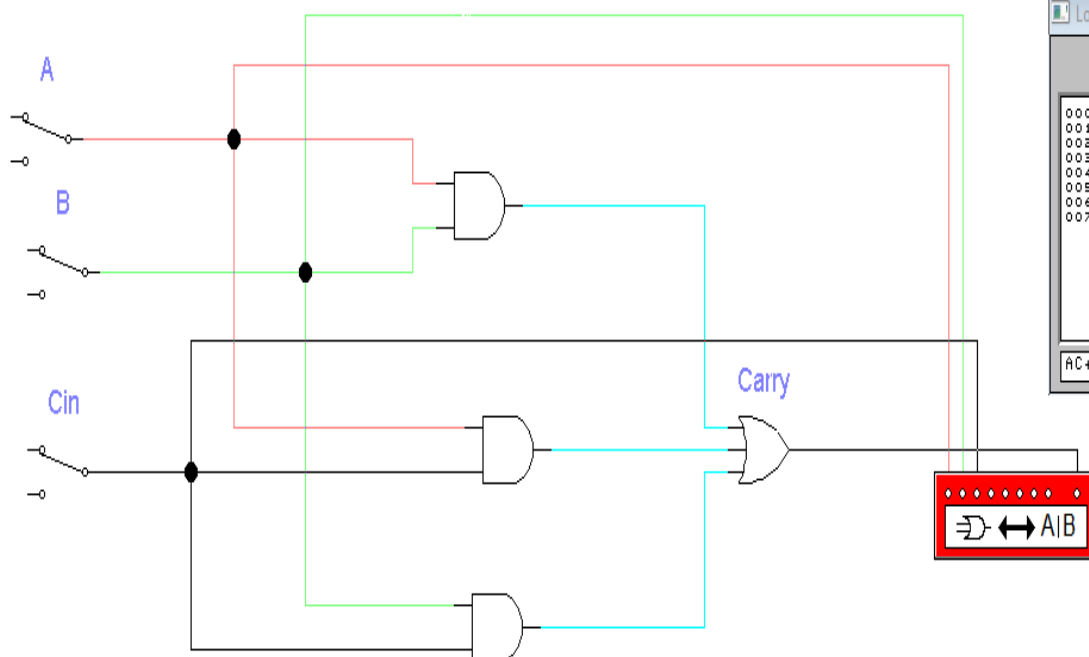
$A/B \rightarrow \overline{101}$

$A/B \rightarrow \Rightarrow$

$A/B \rightarrow \text{NAND}$

$A'B'C + A'BC' + AB'C' + ABC$

Carry Output



Logic Converter

Out ☐

	A	B	C	D	E	F	G	H
000	0	0	0					0
001	0	0	1					0
002	0	1	0					0
003	0	1	1					1
004	1	0	0					0
005	1	0	1					1
006	1	1	0					1
007	1	1	1					1

Conversions

\Rightarrow \rightarrow $\overline{101}$

$\overline{101} \rightarrow A/B$

$\overline{101} \xrightarrow{\text{SIMP}} A/B$

$A/B \rightarrow \overline{101}$

$A/B \rightarrow \Rightarrow$

$A/B \rightarrow \text{NAND}$

$AC+AB+BC$

Truth Table

Logic Converter

Out ☐

	A	B	C	D	E	F	G	H
000	0	0	0					0
001	0	0	1					0
002	0	1	0					0
003	0	1	1					1
004	1	0	0					0
005	1	0	1					1
006	1	1	0					1
007	1	1	1					1

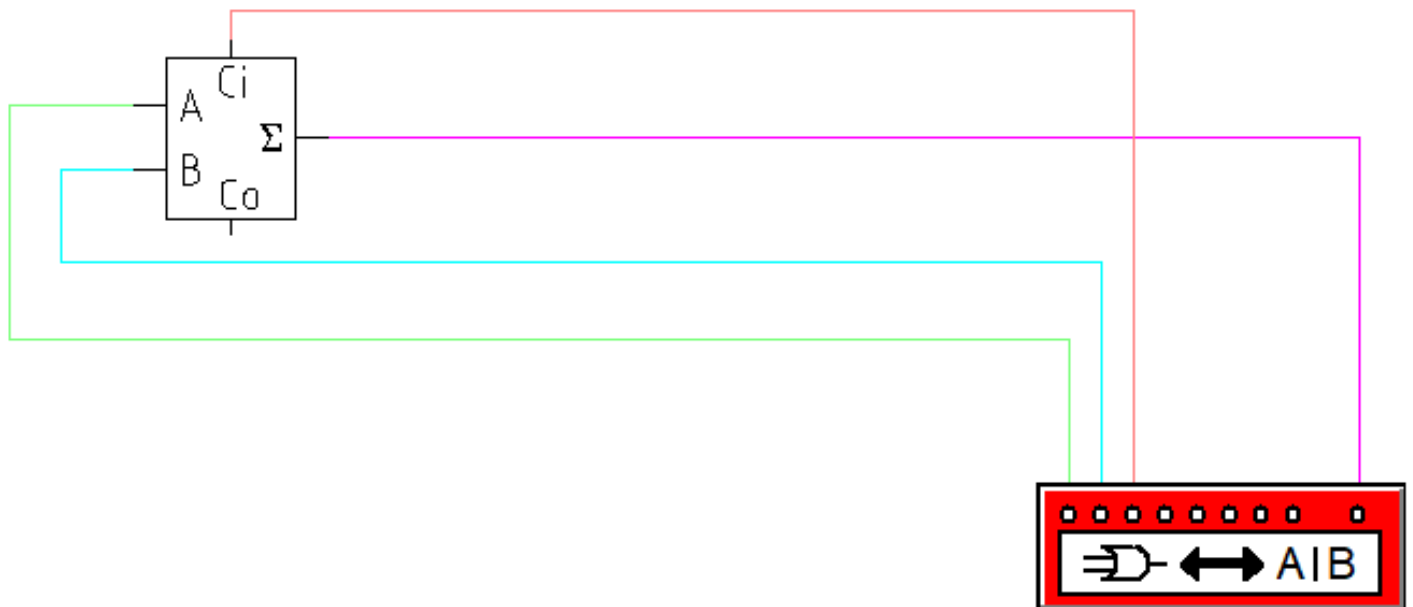
Conversions

→ $\overline{1}01$
 $\overline{1}01$ → $A\overline{B}$
 $\overline{1}01$ $\xrightarrow{\text{SIMP}}$ $A\overline{B}$
 $A\overline{B}$ → $\overline{1}01$
 $A\overline{B}$ →
 $A\overline{B}$ →

$AC + AB + BC$

Using Built-In Full Adder

Sum Output



Truth Table

Logic Converter

Out ☐

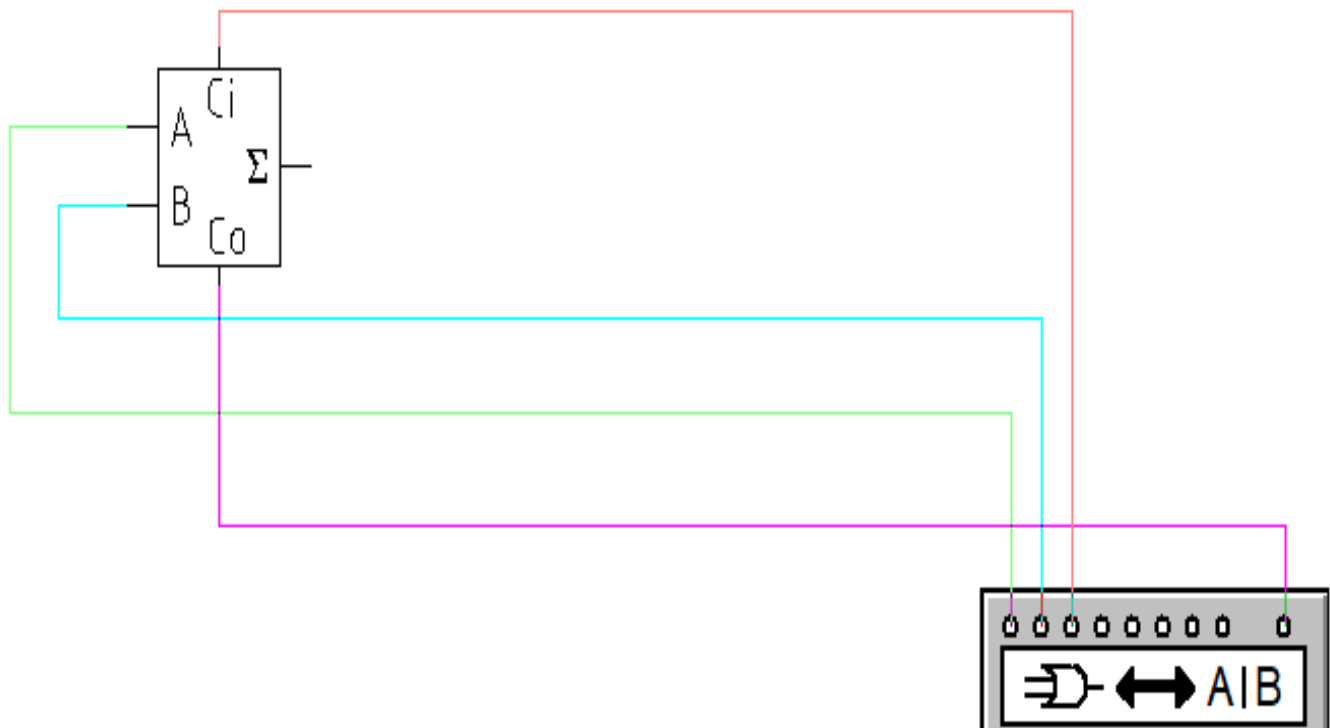
	A	B	C	D	E	F	G	H
000	0	0	0					0
001	0	0	1					1
002	0	1	0					1
003	0	1	1					0
004	1	0	0					1
005	1	0	1					0
006	1	1	0					0
007	1	1	1					1

Conversions

- \Rightarrow \rightarrow $\overline{10|1}$
- $\overline{10|1} \rightarrow A|B$
- $\overline{10|1} \xrightarrow{\text{SIMP}} A|B$
- $A|B \rightarrow \overline{10|1}$
- $A|B \rightarrow \Rightarrow$
- $A|B \rightarrow \text{NAND}$

$A'BC + AB'C + ABC' + ABC$

Carry Output



Truth Table

Logic Converter

Input variables: A, B, C, D, E, F, G, H

ABC	A	B	C	Output
000	0	0	0	0
001	0	0	1	0
002	0	1	0	0
003	0	1	1	1
004	1	0	0	0
005	1	0	1	1
006	1	1	0	1
007	1	1	1	1

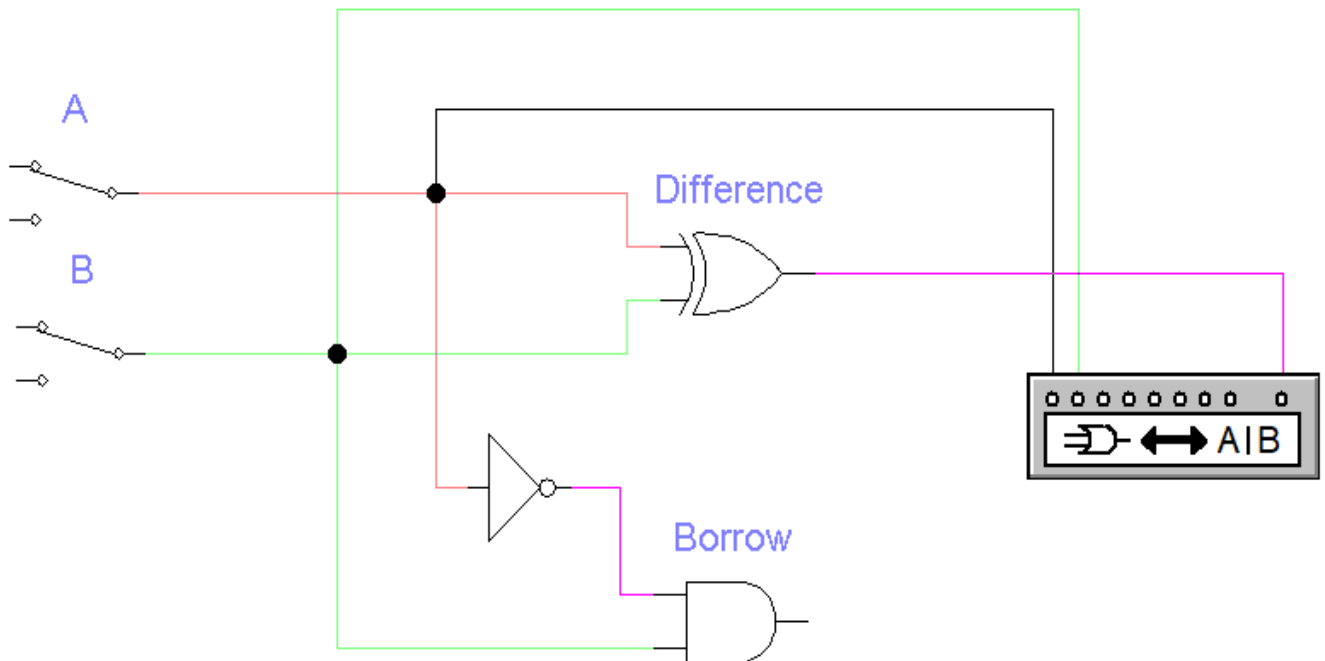
Conversions:

- $\Rightarrow D \rightarrow \overline{10|1}$
- $\overline{10|1} \rightarrow A/B$
- $\overline{10|1} \xrightarrow{SIMP} A/B$
- $A/B \rightarrow \overline{10|1}$
- $A/B \rightarrow \Rightarrow D$
- $A/B \rightarrow NAND$

Output: $A'BC + AB'C + ABC' + ABC$

Half Subtractor

Difference Output



Truth Table

Logic Converter

A B C D E F G H

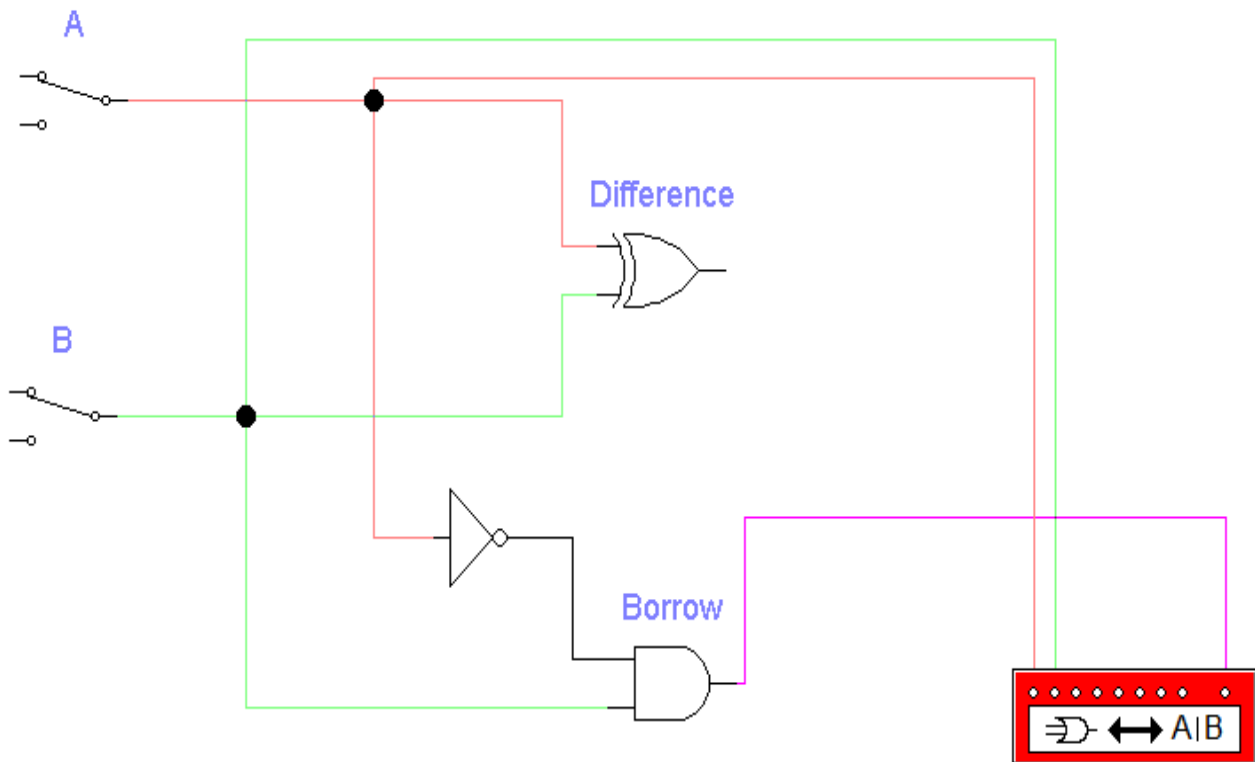
000	0	0						0
001	0	1						1
002	1	0						1
003	1	1						0

Conversions

\Rightarrow	\rightarrow	$\overline{101}$
$\overline{101}$	\rightarrow	A/B
$\overline{101}$	$\xrightarrow{\text{SIMP}}$	A/B
A/B	\rightarrow	$\overline{101}$
A/B	\rightarrow	\Rightarrow
A/B	\rightarrow	NAND

$A'B + AB'$

Borrow Output



Truth Table

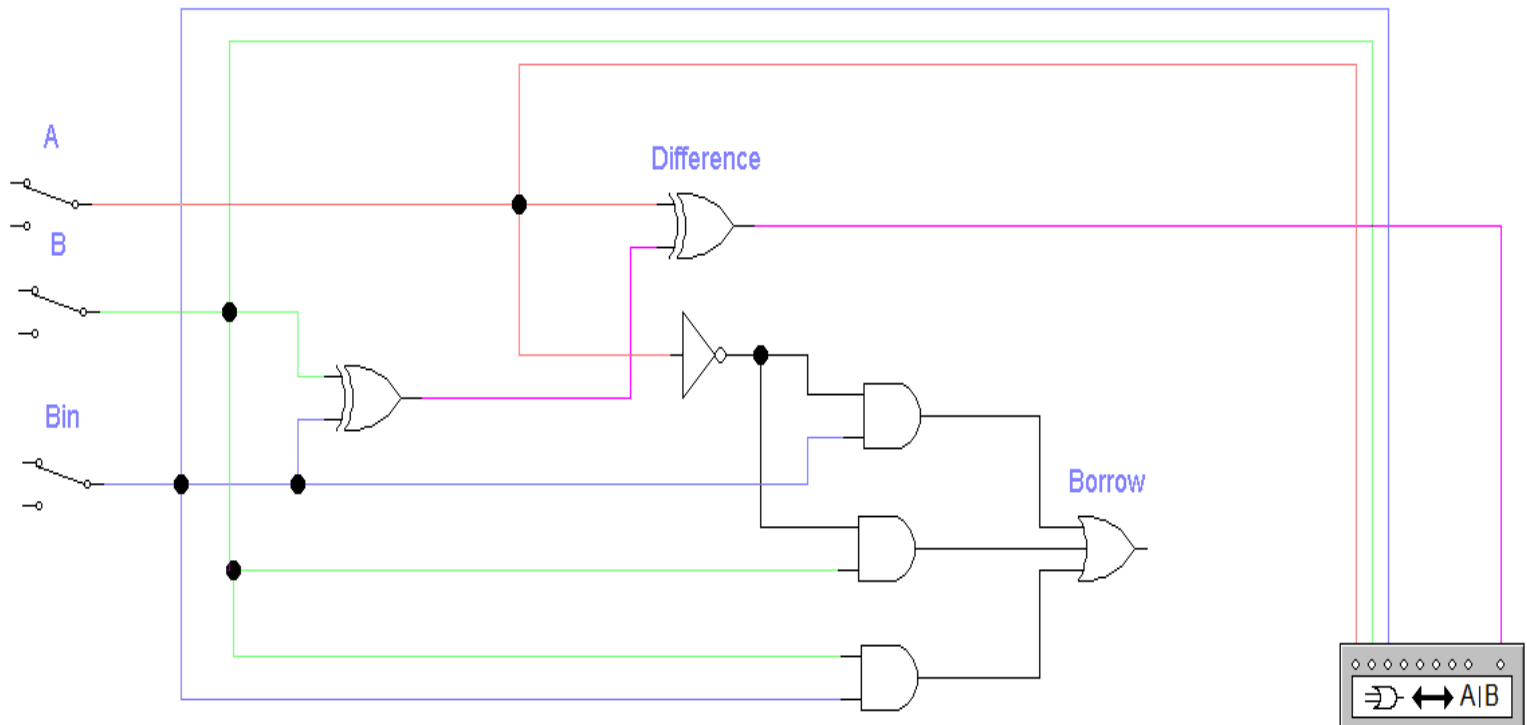
Logic Converter							
A	B	C	D	E	F	G	H
000	0	0					0
001	0	1					1
002	1	0					0
003	1	1					0

Conversions	
\Rightarrow	$\rightarrow \overline{10 1}$
$\overline{10 1}$	$\rightarrow A/B$
$\overline{10 1}$	$\xrightarrow{\text{SIMP}} A/B$
A/B	$\rightarrow \overline{10 1}$
A/B	$\rightarrow \Rightarrow$
A/B	$\rightarrow \text{NAND}$

$A' B$

Full Subtractor

Difference Output



Truth Table

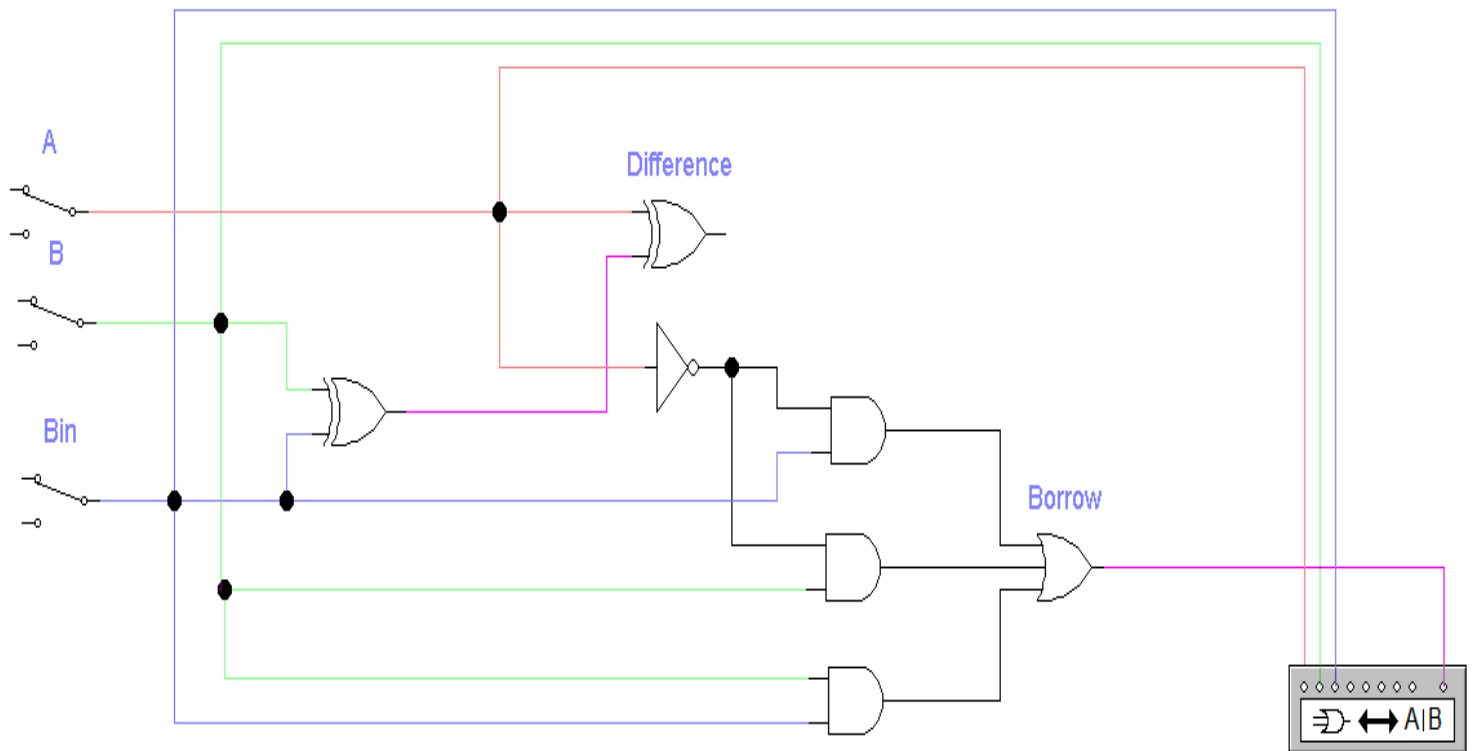
Logic Converter								Out	
	A	B	C	D	E	F	G	H	
000	0	0	0						0
001	0	0	1						1
002	0	1	0						1
003	0	1	1						1
004	1	0	0						1
005	1	0	1						0
006	1	1	0						0
007	1	1	1						1

$$A'B'C + A'BC' + AB'C' + ABC$$

Conversions

\Rightarrow	\rightarrow	$\overline{101}$
$\overline{101}$	\rightarrow	A/B
$\overline{101}$	SIMP \rightarrow	A/B
A/B	\rightarrow	$\overline{101}$
A/B	\rightarrow	\Rightarrow
A/B	\rightarrow	NAND

Borrow Output



Truth Table

Logic Converter

A B C D E F G H

000	0	0	0					0
001	0	0	1					1
002	0	1	0					1
003	0	1	1					1
004	1	0	0					0
005	1	0	1					0
006	1	1	0					0
007	1	1	1					1

Out ☒

Conversions

101

101

101

A/B

101

SIMP

A/B

A/B

101

A/B

A/B

NAND

A'B+A'C+BC