

BIT PATTERN	DENARY PATTERN
00000000	0
00000001	1
11111111	255
00000011	3
11111101	-3
00011111	31
11100001	-31

Binary Data



NOT	A'	$\neg A$	\bar{A}	$\neg A$	+
AND	AB	$A \cdot B$	$A \cdot B$	$A \wedge B$	$A \cap B$
OR	$A+B$	$A \vee B$	$A \cup B$	=	
NAND	$(AB)'$	\overline{AB}			
NOR	$(A+B)'$	$\overline{A \vee B}$			
XOR	$A \oplus B$	$A \ominus B$			
XNOR	$(A \oplus B)'$	$\overline{A \ominus B}$	$(A \odot B)$	$\overline{A \odot B}$	

Logical Operators

```

getline(cin, s);
system("cls");
stringstream(sInput) >> delTemp;
stringstream(sInput).length();
ilength = sInput.length();
if (ilength < 4) {
    again = true;
    continue;
} else if (sInput[ilength - 3] != '.') {
    again = true;
    continue;
} else if (sInput[ilength - 2] != '0') {
    again = true;
    continue;
} else if (sInput[ilength - 1] != '0') {
    again = true;
    continue;
}

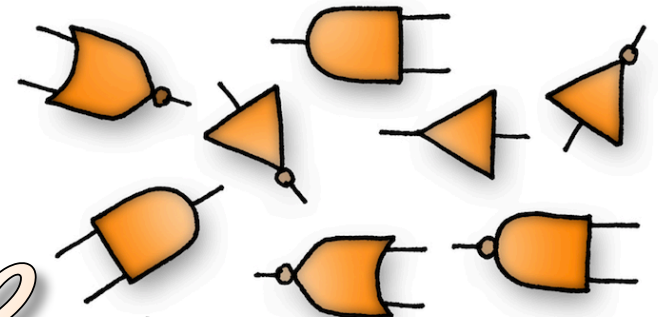
```

CS & Math's

KnowIT
COMPUTATIONAL LOGIC

A	B	CARRY-IN	SUM	CARRY-OUT
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

Truth Tables



Logic Diagrams

Binary Data

- How does a Turing machine work?
- What is the problem with Moore's Law and transistors?
- Investigate quantum computing. How do bits represent information in a quantum computer?
- What is a qubit and what does superposition mean?

Computer Mathematics

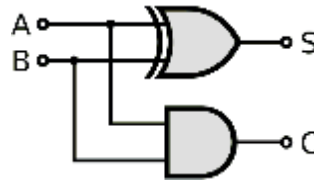
`Print(round(12+(6/9)*3-2,5))`

What is the answer to this problem?

- Explain how you arrived at your answer
- Mr Jones is writing a CS book. The text file has a maximum of 15,000 lines. Each page can fit 55 lines. Show how the MOD function can be used to determine whether the text file is long enough.
- Explain how two's complement works.
- Calculate this two's complement addition $10001111 + 11110000$ Does the result create an issue in an 8 bit system? Explain your answer
- What does the expression $23 \text{ DIV } 6$ evaluate to?
- Discuss integer division with reference to MOD and DIV

Logic Gates & Diagrams

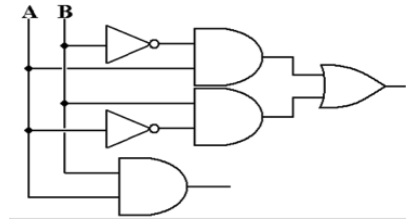
Create the Boolean expression for this logic circuit



Label the gates

What does the circuit represent?

Explain how the circuit represents the flow of binary data in a computer

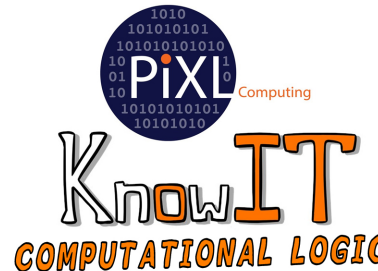


Explain the relationship between this logic circuit and the one to the left

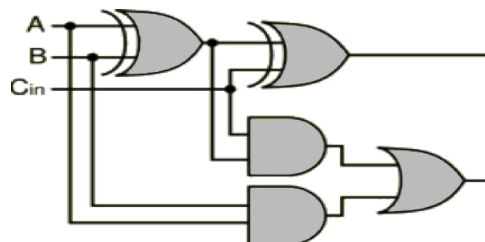
The top logic diagram has the expression $A \oplus B$

The bottom logic diagram has the expression $A \wedge B \vee A \wedge \overline{B}$

- Which outputs do the expressions refer to?
- What input values would produce an output of 1 for the expressions?
- Discuss the importance of logic gates, truth tables and Boolean expressions in computer science



Truth Tables



What does the circuit represent?

Discuss how the circuit might be used in a calculator

Create the truth table for this logic circuit and label the gates