

Logic & Truth Tables

Logical Operators

- Allow conditional statements to be linked together
- Three kinds
 - `&&` → And
 - `||` → Or
 - `!` → Not (negates the statement)



Logical Operators

- Three kinds
 - `&&` → And
 - `||` → Or
 - `!` → Not (negates the statement)

```
/* If wind > 130 and wind < 156 */
```

```
If (wind >= 130 && wind <= 156) {  
    /* Code */  
}
```

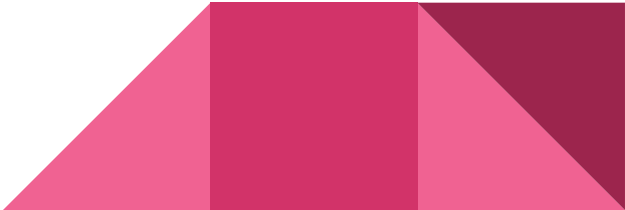


Logical Operators

- There has to be TWO statements joined with && or ||

```
/* If wind > 130 and wind < 156 and wind  
== 140 */
```

```
If (wind >= 130 && wind <= 156 && wind  
== 140) {  
    /* NOT VALID C LOGIC */  
}
```

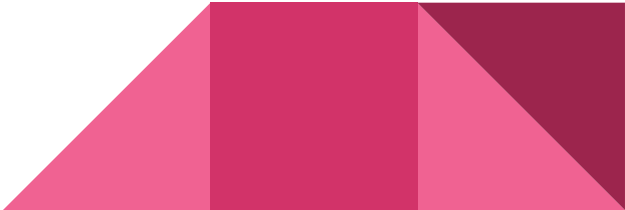


Logical Operators

- Can use order or operations to force statements into pairs

```
/* If (wind > 130 and wind < 156) and  
wind == 140 */
```

```
If ((wind >= 130 && wind <= 156) && wind  
== 140) {  
    /* VALID C LOGIC */  
}
```



Truth Tables

- Explain the logic of a situation, using `!`, `&&`, and `||` syntax
- Use single letters (A, B, C, etc...) to denote *states of existence*
 - By default, states are true



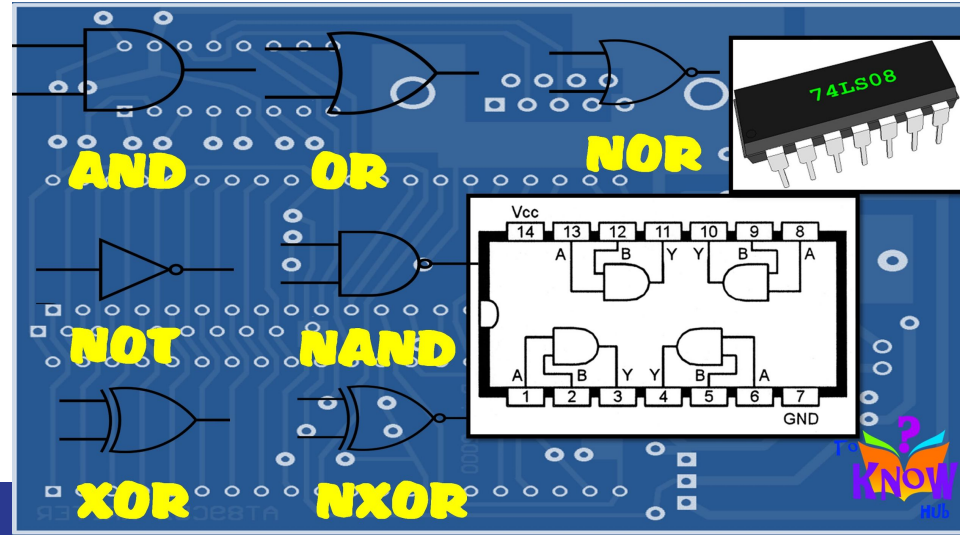
Truth Tables

~~Lies~~
Truth

<i>State of Existence</i>	<i>True / False</i>
A	T
!A	F

Truth Tables

- States of existence can be combined in a variety of ways
 - Commonly use the &&, ||, and ! notation
 - There are other ways of combining states...



Logic in action - Wumpus World



- Go to <https://osric.com/wumpus/>
 - Goal = kill the wumpus by shooting an arrow (without dying)
 - Rules are on the page

Logic - Wumpus World

- There are 7 states in the Wumpus World:
 - W: Wumpus
 - B: Bats
 - S: Smell
 - F: Flapping
 - A: Arrow
 - P: Pit
 - I: Wind



Logic - Wumpus World



- There are 7 states in the Wumpus World:
 - W: Wumpus
 - B: Bats
 - S: Smell
 - F: Flapping
 - A: Arrow
 - P: Pit
 - I: Wind

Technically, there are
8 \rightarrow L: Alive

Logic - Wumpus World

- W: Wumpus
 - $W \rightarrow$ Wumpus is in that square
 - Therefore, $!L$
 - $W \rightarrow !L$
 - $!W \rightarrow$ Wumpus is not in that square
 - Therefore, L
 - $!W \rightarrow L$



Logic - Wumpus World

- Task: Write 5 logical operators dealing with Wumpus World, resulting in $L \parallel !L$
 - Write on the “Wumpus” section of your truth table paper
 - Goal = combine different states

