### Boolean Logic and If-Statements

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>a == b</th>
<th>a != b</th>
<th>a and b</th>
<th>a or b</th>
<th>not a</th>
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Boolean Logic

Programming languages make decisions in binary terms

Two boolean values: True and False

True and False can be assigned to variables, just like strings and numbers

Logical operators for boolean values: ==, !=, and, or, and not
**Equivalence**

\[ a \equiv b \]

Evaluates to True when \( a \) and \( b \) are the same:

- Both \( a \) and \( b \) are True
- Both \( a \) and \( b \) are False
Negation

 Evaluates to True when a and b are not the same:
• a is True and b is False
• a is False and b is True
And

\( a \text{ and } b \)

Evaluates to True when both \( a \) and \( b \) are True:

- \( a \) is True and \( b \) is True
Or

\[ a \ \text{or} \ b \]

Evaluates to True when \( a \) is True \( or \) \( b \) is True:

- \( a \) is True and \( b \) is True
- \( a \) is True and \( b \) is False
- \( a \) is False and \( b \) is True
Not

Evaluates to True when \( a \) is False and False when \( a \) is True:

- \( a \) is False
- \( b \) is False
# Truth Table

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Order of Execution

Highest to Lowest

- `a == b`
- `a != b`
- `not a`
- `a and b`
- `a or b`
Conditional Statements

Allow you to change the flow of a Python program

Consist of if-statements

Introduce code blocks
If/Else-Statements

if

else

Begins with the keyword if
Followed by a Boolean expression
May be followed by an else block for alternate conditions
If/Else If-Statements

```python
if
elif
```

If-statement with more than one condition

Multiple `elif` blocks are permitted

else block is optional
Semantic Indentation

Code blocks are meaningful in Python

Indentation marks blocks of code and is not an optional format

Code blocks must be indented consistently by the same amount

As a result, Python code is clearer and more legible
Introduction to Computer Programming
CSCI-UA 2

Control Structures
Boolean Logic and If-Statements