Comparison operators

INTERMEDIATE PYTHON FOR FINANCE

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Python comparison operators

- **Equality:** `==` , `!=`
- **Order:** `<` , `>` , `<=` , `>=`

Equality operator vs assignment

Test equality: `==`

Assign value: `=`

Equality operator vs assignment

```
13 == 13
```

```
True
```

```
count = 13
print(count)
```

```
13
```

Equality comparisons

- datetimes
- numbers (floats, ints)
- dictionaries
- strings
- almost anything else

Comparing datetimes

```
date_close_high = datetime(2019, 11, 27)
date_intra_high = datetime(2019, 11, 27)
print(date_close_high == date_intra_high)
```

```
True
```

Comparing dictionaries

```
d1 = {'high':56.88, 'low':33.22, 'closing':56.88}
d2 = {'high':56.88, 'low':33.22, 'closing':56.88}
print(d1 == d2)
```

```
True
```

```
d1 = {'high':56.88, 'low':33.22, 'closing':56.88}
d2 = {'high':56.88, 'low':33.22, 'closing':12.89}
print(d1 == d2)
```

```
False
```

Comparing different types

```
print(3 == 3.0)
```

```
True
```

```
print(3 == '3')
```

```
False
```

Not equal operator

```
print(3 != 4)
```

```
True
```

```
print(3 != 3)
```

```
False
```

Order operators

- Less than `<`
- Less than or equal `<=`
- Greater than `>`
- Greater than or equal `>=`

Less than operator

```
print(3 < 4)
```

```
True
```

```
print(3 < 3.6)
```

```
True
```

```
print('a' < 'b')
```

```
True
```

Less than operator

```
date_close_high = datetime(2019, 11, 27)
date_intra_high = datetime(2019, 11, 27)
print(date_close_high < date_intra_high)
```

```
False
```

Less than or equal operator

```
print(1 <= 4)
```

```
True
```

```
print(1.0 <= 1)
```

```
True
```

```
print('e' <= 'a')
```

```
False
```

Greater than operator

```
print(6 > 5)
print(4 > 4)
```

```
True
```

```
False
```

Greater than or equal operator

```
print(6 >= 5)
print(4 >= 4)
```

```
True
```

```
True
```

Order comparison across types

```
print(3.45454 < 90)
```

```
True
```

```
print('a' < 23)
```

```
<hr />-------------------------------------------
TypeError      Traceback (most recent call last)
...
TypeError: '<' not supported between instances of 'str' and 'int'
```

Let's practice!

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Boolean operators

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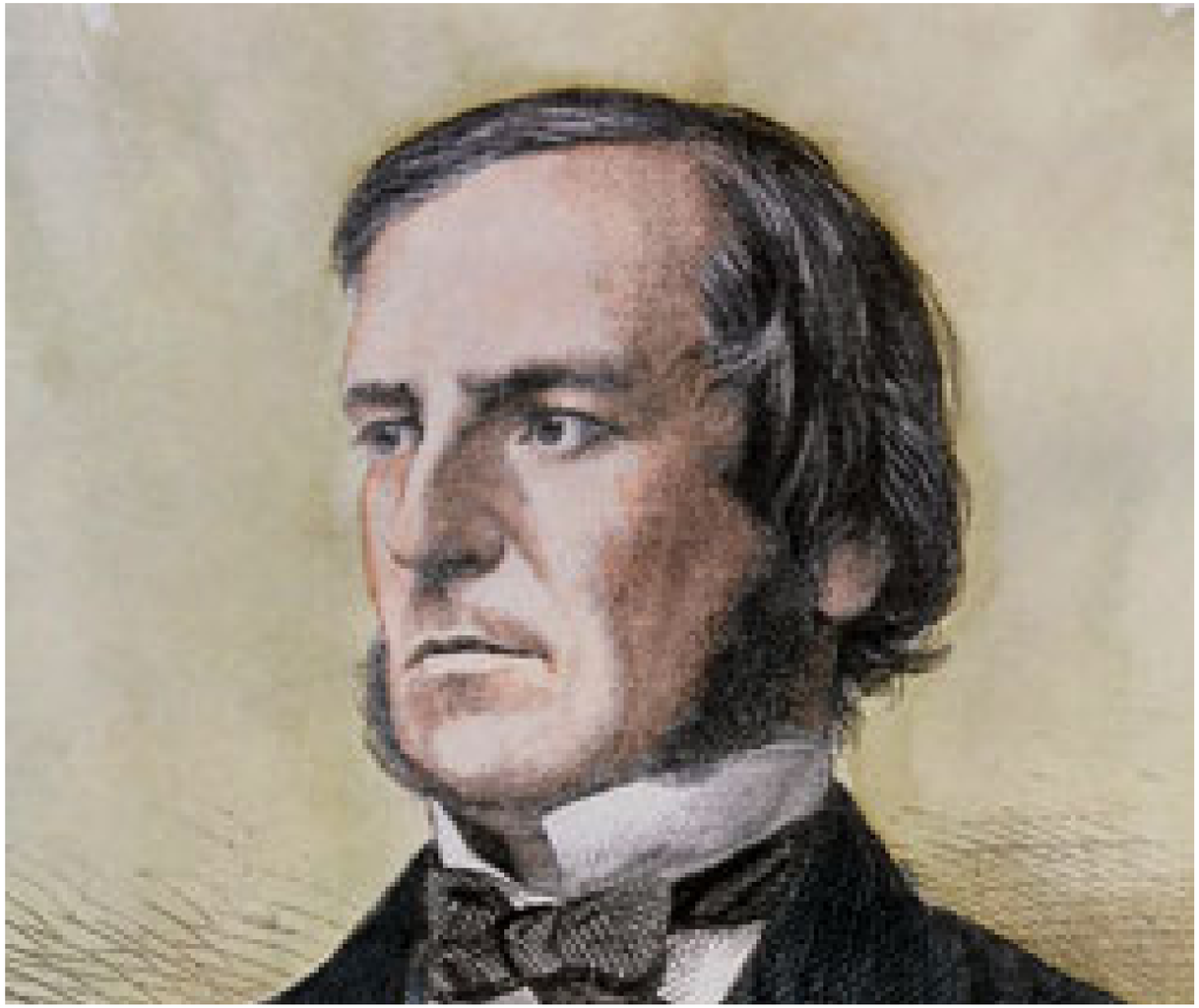
Boolean logic



What are boolean operations?

1. `and`
2. `or`
3. `not`

Object evaluation

Evaluates as False

- Constants:
  - `False`
  - `None`
- Numeric zero:
  - `0`
  - `0.0`
- Length of zero
  - `""`
  - `[]`

Evaluates as True

- Almost everything else

The AND operator

```
True and True
```

```
True
```

```
True and False
```

```
False
```

The OR operator

```
False or True
```

```
True
```

```
True or True
```

```
True
```

```
False or False
```

```
False
```

Short circuit.

```
is_current() and is_investment()
```

```
False
```

```
is_current() or is_investment()
```

```
True
```

The NOT operator

```
not True
```

```
False
```

```
not False
```

```
True
```

Order of operations with NOT

```
True == False
```

```
False
```

```
not True == False
```

```
True
```

Object evaluation

```
"CUSIP" and True
```

```
True
```

Object evaluation

```
[] or False
```

```
False
```

Object evaluation

```
not {}
```

```
True
```

Returning objects

```
"Federal" and "State"
```

Remember that the AND and OR only evaluate as many items as necessary. Both of these operators return the last item that they evaluate.

```
"State"
```

```
[] and "State"
```

```
[]
```

Returning objects.

```
13 or "account number"
```

```
13
```

```
0.0 or {"balance": 2200}
```

```
{"balance": 2200}
```

Let's practice!

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If statements

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Printing sales only

```
trns = { 'symbol': 'TSLA', 'type':'BUY', 'amount': 300}
```

```
print(trns['amount'])
```

```
300
```

Compound statements

```
control statement
    statement 1
    statement 2
    statement 3
```

Control Statement

```
if <expression> :
```

```
if x < y:
```

```
if x in y:
```

```
if x and y:
```

```
if x:
```

Code blocks

```
if <expression>:
    statement
    statement
    statement
```

```
if <expression>: statement;statement;statement
```

Printing sales only

```
trns = { 'symbol': 'TSLA', 'type':'BUY', 'amount': 300}
```

```
if trns['type'] == 'SELL':
    print(trns['amount'])
```

```
trns['type'] == 'SELL'
```

```
False
```

Printing sales only.

```
trns = { 'symbol': 'APPL', 'type':'SELL', 'amount': 200}
```

```
if trns['type'] == 'SELL':
    print(trns['amount'])
```

```
200
```

Else

```
if x in y:
    print("I found x in y")
else:
    print("No x in y")
```

Elif

```
if x == y:
    print("equals")
elif x < y:
    print("less")
```

Elif

```
if x == y:
    print("equals")
elif x < y:
    print("less")
elif x > y:
    print("more")
elif x == 0
    print("zero")
```

Else with elif

```
if x == y:
    print("equals")
elif x < y:
    print("less")
elif x > y:
    print("more")
elif x == 0
    print("zero")
else:
    print("None of the above")
```

Let's practice!

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For and while loops

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Repeating a code block

CUSIP	SYMBOL
037833100	AAPL
17275R102	CSCO
68389X105	ORCL

Loops.

For loop

While loop

Statement components

```
<Control Statement>
    <Code Block>
```

```
execution 1
```

```
execution 2
```

```
execution 3
```

For loops

```
for <variable> in <sequence>:
```

```
for x in [0, 1, 2]:
```

```
d = {'key': 'value1'}
for x in d:
```

```
for x in "ORACLE":
```

List example

```
for x in [0, 1, 2]:
    print(x)
```

```
0
1
2
```

Dictionary example

```
symbols = {'037833100': 'AAPL',
           '17275R102': 'CSCO'
           '68389X105': 'ORCL'}
for k in symbols:
    print(symbols[k])
```

```
AAPL
CSCO
ORCL
```

String example

```
for x in "ORACLE":
    print(x)
```

```
O
R
A
C
L
E
```

While control statements

```
while <expression>:
```

While example

```
x = 0

while x < 5:
    print(x)
    x = (x + 1)
```

```
0
1
2
3
4
```

Infinite loops

```
x = 0

while x <= 5:
      print(x)
```

Skipping with continue

```
for x in [0, 1, 2, 3]:
    if x == 2:
        continue
    print(x)
```

```
0
1
3
```

Stopping with break.

```
while True:
    transaction = get_transaction()
    if transaction['symbol'] == 'ORCL':
        print('The current symbol is ORCL, break now')
        break
    print('Not ORCL')
```

```
Not ORCL
Not ORCL
Not ORCL
The current symbol is ORCL, break now
```

Let's practice 'for' and 'while' loops!

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