

Python Operators

CMSC 201

Tuesday, September 10 2019

Operators

Ways of combining data and values

Arithmetic Operators - +, -, *, /, ...

Logical Operators - and, or, not

Quick Review from last week

Variables

- Assignment
- Type

IDEs

- Spyder
- PyCharm

Arithmetic operators

- Addition, subtraction and multiplication work the way you'd expect
 - Int (integer) op Int yields an int
 - $6 + 6 = 12$; $6 * 6 = 36$; $6 - 6 = 0$
 - All integers
 - If there's a float involved, the result is a float
 - $6 * 8.0 = 48.0$; float
 - Commutative

Division

- Division involving floats
 - Examples in coding
- Division involving only ints
 - `/` or `//`
 - `%` - take the modulus (remainder)

Exponentiation

`5 ** 3` means 5 raised to the 3rd power

Int & float behavior similar to other operators

Negation

Take the negative of a value

- Turn a negative positive, and a positive negative
-

Operator precedence -

The order in which you do things

- Just like it is in Math!!
- Negation comes first
- Exponentiation comes next
- Then *, /, //, % - go in left to right order if there is more than one
- Then + and - - go in left to right order
- If you want to change the order you use parentheses!!
 - Start from the inner-most parentheses and work out

Now some examples

$2 ** n - 1$ vs $2**(n-1)$

Assignment operators

= means assign the value on the right to the variable on the left

$A = 4 ** 3$ puts the value 64 into the memory location associated with the variable "A"

$+=$, $-=$, $*=$, and $/=$ also exist

They tell the computer to perform the indicated operation and assign the value to the proper variable

$A += 6$ is the same $A = A + 6$

Examples

$A += 6$ is the same as $A = A + 6$

$B -= 2.0$ is the same as $B = B - 2.0$

$C *= 9$ is the same as $C = C * 9$

$D /= 7$ is the same as $D = D/7$ - not $7/D!!!$

Comparison Operators

< less than

<= less than or equal to

> greater than

>= greater than or equal to

== equal to (note the difference from =)

!= not equal to

= vs. ==

- One of them assigns a value; the other compares two values
- `A = 5` is always True if you evaluate it
- `A == 5` will cause an error if A is undefined

Floating point math

Remember that a computer represents a value in a certain number of bits - e.g., a float will be represented in 32 or 64 bits depending on your system.

You can't represent some floats exactly in that few bits

So some comparisons will give you “surprising” results

$0.99 + 0.12 = 1.11$ is False on my Mac!

This is simply a fact with all computers; you have to learn to deal with it.

True and False

`False` is any value that equates to “zero”

`int: 0` `float: 0.0` `string: ""` (empty string)

`True` is any non-zero value. Examples:

`1`, `5.4`, `"You have a very nice hat"`, `3.14`, `60`,
`"Why do you eat so many crackers?"`

Logical Operators

AND - True only if both elements are True; otherwise False

OR - True if either or both elements are True; otherwise False

NOT - True if its argument is False

Logical Operators

Truth Table for and

A	B	A and B
True	True	True
True	False	False
False	True	False
False	False	False

Truth Table for or

A	B	A and B
True	True	True
True	False	True
False	True	True
False	False	False

Truth Table for not

A	Not A
True	False
False	True

Order of operations

- Negation

****** exponentiation

***** **/** **%** **//**

+ **-**

<= **>=** **<** **>** **!=** **==**

not

and

or

- If you don't like this order, use parentheses to change it!!
- We'll fill the remainder of class time with some examples