Lecture 02: Introduction to Python Programming

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Hello World! - hellopy.py

```python
print("Hello World!")
```

- print is a python function.
- It prints any arguments into the console/terminal.
- You just need to put them between quotation signs
- It is very important to close the qutotation and the parenthesis.

How to run a program?

- Install Python
  - Anaconda
  - For Windows, set the PATH variable
- Install an IDE (Integrated Development Environment)
  - Microsoft VS Code
  - PyCharm
- Open a file and write your code
- Run the python program using IDE
  - You might need to install python plugin and/or let the IDE know where your python is installed.
- From terminal just write ”python hellopy.py”

First ever variable

```python
message = "Hello Python World!"
print(message)
```

- This variable is a string
- String is a sequence of characters.
- Anything within quotes is a string!
- Assignment = sets a value to the variable message
- You can try to set any value and see what python prints

First Error?

```
message = "Hello Python World!"
print(mesage)
```

The code above produces an error like below:

```
Traceback (most recent call last):
  File "/Users/swakkhar/hello.py", line 2, in <module>
    print(mesage)
          ^^^^^^
NameError: name 'mesage' is not defined. Did you mean:
'message'?
```

Variable values can change!

```python
message = "Hello Python world!"
print(message)
message = "Hello UIU!"
print(message)
```

- Assigning a new value, replaces the old value.
- print function prints and ends with a newline by default.

Numbers

- There are other types of variables,i.e., numbers
- It's very simple to assign values and print them.

```
x = 5
print(x)
y = 10
print(y)
```

- You can also perform mathematical operations on them.
- Assign the results of this mathematical operations to other variables.

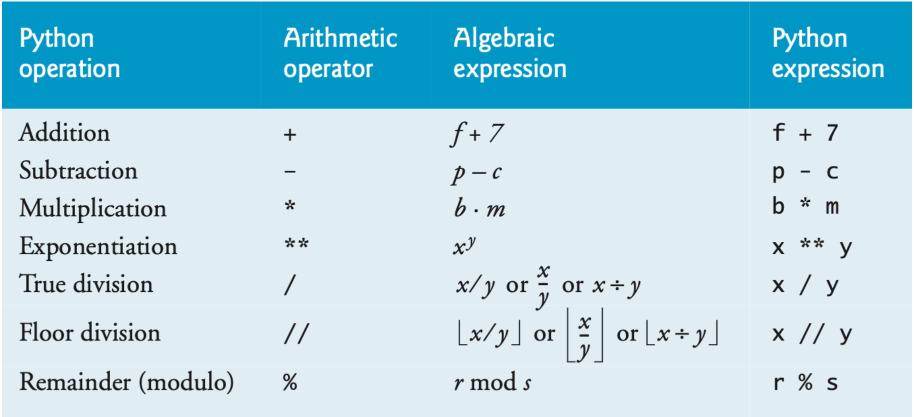
Making averagaes.

```python
marksInMath=50
marksInPhysics=65
average=(marksInMath+marksInPhysics)/2
print(average)
```

A guessing game?

1. Can you think of a number?
2. Multiply it by 2
3. Add 10 to it.
4. Divide it by 2
5. Subtract the initial number from it.
6. I know how much you have now!

Arithmetic Operations



Python operation	Arithmetic operator	Algebraic expression	Python expression
Addition	+	$f + 7$	`f + 7`
Subtraction	–	$p - c$	`p - c`
Multiplication	*	$b \cdot m$	`b * m`
Exponentiation	**	x^y	`x ** y`
True division	/	x/y or $\frac{x}{y}$ or $x \div y$	`x / y`
Floor division	//	$\lfloor x/y \rfloor$ or $\left\lfloor \frac{x}{y} \right\rfloor$ or $\lfloor x \div y \rfloor$	`x // y`
Remainder (modulo)	%	$r \bmod s$	`r % s`

Example: Arithmetic

```
x = 9
y = 2
print(x+y)
print(x-y)
print(x*y)
print(x/y)
print(x//y)
print(x**y)
print(x%y)
```

Grouping - parenthesis

- Parentheses group Python expressions, as they do in algebraic expressions.
- Python applies certain operators from left to right except for the exponentiation operator (**).

```
print(10 * (5 + 3))
print(10 * 5 + 3)
```

Arithmetic - Quiz

1. Evaluate the following expressions.
    1. 9 ** (1 / 2)
    2. 3 // 5
    3. 17 % 5
    4. -13 // 4
    5. 123 / 0

Operator Precedence Rule

1. Expressions in parentheses evaluate first. Parentheses may force the order of evaluation to occur in any sequence you desire. In expressions with nested parentheses, the expression in the innermost parentheses evaluates first.
2. Exponentiation operations evaluate next. If an expression contains several exponentiation operations, Python applies them from right to left.
3. Multiplication, division and modulus operations evaluate next. If an expression contains several multiplication, true-division, floor-division and modulus operations, Python applies them from left to right. Multiplication, division and modulus are “on the same level of precedence.”
4. Addition and subtraction operations evaluate last. If an expression contains several addition and subtraction operations, Python applies them from left to right. Addition and subtraction also have the same level of precedence.

Arithmetic - Quiz

1. Given that $y = ax^3 + 7$, which of the following is not a correct statement for this equation?
    1. y = a * x * x * x + 7
    2. y = a * x ** 3 + 7
    3. y = a * (x * x * x) + 7
    4. y = a * x * (x * x + 7)
2. Evaluate the expression 3 * (4 - 5) with and without parentheses. Are the parentheses redundant?

Variable Naming

- Variable names can contain only letters, numbers, and underscores. They can start with a letter or an underscore, but not with a number. For instance, you can call a variable message_1 but not 1_message.
- Spaces are not allowed in variable names, but underscores can be used to separate words in variable names. For example, greeting_message works but greeting message will cause errors.
- Avoid using Python keywords and function names as variable names. For example, do not use the word print as a variable name; Python has reserved it for a particular programmatic purpose.
- Variable names should be short but descriptive. For example, name is better than n, student_name is better than s_n, and name_length is better than length_of_persons_name.
- Be careful when using the lowercase letter l and the uppercase letter O because they could be confused with the numbers 1 and 0.

Variable Naming - Quiz

1. Which of the following is not a correct variable name in Python?
    1. _hello
    2. hello1
    3. 1_hello
    4. hello 1
    5. _print
2. Are these similar?
    1. name0 and nameO
    2. print1 and printl