Python Cheat Sheet

This document contains a list of the tools that will be required to write a script for each problem in the algorithm project. The goal of the project is to develop. general solutions for mathematics problems, and convert the general solutions to automated programs. A more comprehensive set of detailed instructions can be found at: https://www.w3schools.com/python/default.asp

Printing Text

In python text is written using the print() function. For example, if I wanted to print "Hello World":

```
print("Hello World")
```

For the progams we write in class, we will start by printing a description of what the programs do.

Comments

Comments are used in python for the script writer to note what they are doing, and why they are doing it. When executing a program comments are "invisible". The # sign makes a comment. For example:

```
print("Hello World") # This will print "Hello World"
```

Assigning Variables

In python you can assign variables using the = operator. For example, say I want to assign a height of 5 to the variable h:

```
h = 5 # This assigns 5 to the variable h
```

Data - Types

We will deal with 4 different data types in python:

- **string:** string data is text
- **int:** int is used to denote "integer"
- **float:** float is used for real number
- **bool:** bool stands for boolean operator. This is for logic operations (True/False).

Math Operations In Python

In python math operations are very similar to your calculator. Below is a table summarizing basic operations through illustrated example:

Operation	Mathematics	Python
Addition	$a + b$	a+b
Subtraction	$a + b$	a-b
Multiplication	$a \times b$	a*b
Division	$\frac{a}{b}$	a/b
Exponentiation	a^b	a**b

We will also use the **modulus** operator, %. This operator finds the remainder of a quotient. For example:

```
5%4 # This will return 1, as 5/4 has 1 remainder
5%5 # This will return 0, as 5/5 has 0 remainder
```

The math package will also be required. The math package is a pre-written set of functions for python users that helps with math operations. To use the math package:

```
import math # imports the math package
pi = math.pi # Create pi variable
```

Taking Input From User

In order to take input from a user we use the input() function. We also want to define the type of data the user is inputing. Text can be added directly int he input function. For example, suppose I want the user to input their age:

```
age = int(input("Input your age: "))
```

This line will assign what the user inputs to the variable age, and convert the data type into an integer.

If Statements

If statements are used when testing some sort of condition. If takes in some sort of operation, and evaluates as True, or False. "Else" is what executes if the original statement if false. For example, suppose I wanted to print "above five" if a variable x is above five:

```
x = 7
if x>5 :
  print("above five")
else :
  print("not above five")
```

In the terminal "above five" will print.

For/While Loops

Loops are used when doing iterative operations. While loops continue to execute until a condition is met. For example say I wanted to print the numbers up to 50 fast:

```
count = 1 # counter variable
while count < 51 :
  print(count) # prints number
  count = count + 1 # adds 1 to the counter
```

In the Terminal this will print each number from 1 to 50. For loops works very similar too while loops. They run a statement over a defined number of iterations. or example say I wanted to print the numbers up to 50 fast:

```
for i in range(1,50): # i=1, then i=2,...
  print(i)
```

Running A Program On A Mac

i. Open Terminal (command+space → type terminal).

ii. Navigate to program directory:

- pwd: prints "working directory", or directory that you are in.
- ls: "list" prints what is in your current directory
- cd → new directory : Navigates to new directory. You need to go to directory with your python program.

iii. Type "python filename.py" and your program will run.

Running A Program On A Windows

i. Open command prompt

ii. Navigate to program directory:

- pwd: prints "working directory", or directory that you are in.
- ls: "list" prints what is in your current directory
- cd → new directory : Navigates to new directory. You need to go to directory with your python program.

iii. Type "python filename.py" and your program will run.