COMP 118: Procedural Programming. Fall 2003.

# Python Cheat Sheet

When learning about a new technical area there's often a bewildering amount of detail to keep track of. Generations of techies have made use of cheat sheets to have an easy reference to these details.
A more detailed alternative is provided by the Python Quick Reference. If you want to print it out or save it locally several forms are available

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## Arithmetic

Constants (Number types):

- integers, e.g. 18, -341. A suffix L indicates a long integer, e.g. 34251673L.
- floating point values, e.g. 3.001

Operations:

- **+** for addition
- **-** for subtraction
- * for multiplication
- / for division (watch for integer division, e.g. 19 / 4 = 4, not 4.75)
- **%** for remainder or modulo, e.g. 19 % 4 = 3
- ** for exponentiation, e.g. 2 ** 4 = 16

## Strings

Constants: **"This is a string"**

Operations:

- **=** for assignment, e.g. **name = "Tim Topper"**
- **+** for concatenation, e.g. **"Hi" + "Ho"** --> **"HiHo"**
- * for repetition, e.g. **3 * "Ho"** --> **"HoHoHo"**

Notes:

- Strings can be delimited by either double quotes **"Tim"** or single quotes **'Tim'**.
- Multiline values can be assigned to a string by triple quoting the contents, e.g.

```
silly = """Two
Lines"""
```

  Trying the same thing without triple quoting results in an error, e.g.

```
silly = "Two
Lines"
```

- Another method is to embed control codes for newline characters into the string, e.g.

```
silly = "Two\nLines"
```

  The most common control codes are: **\n** for newline and **\t** for tab. The Python Quick Reference provides a complete list.

Like lists Python strings are a sequence type so many list commands also work with strings.

- e.g. **s[ i ]** accesses element number **i** of the string **s**.

Testing string contents:

- **s.isalnum()**
- **s.isalpha()**
- **s.isdigit()**
- **s.isspace()**
- **s.islower()**
- **s.isupper()**
- **s.istitle()**
- **s.endswith( suffix )**
- **s.startswith( prefix )**

Finding things in strings:

- **s.count( substring )**
- **s.find( substring )**
- **s.index( substring )**
- **s.rfind( substring )**
- **s.rindex( substring )**

Changing strings. Remember that strings are immutable so to make a change "stick" you have to do, e.g. **s = s.title()**.

- **s.swapcase()**
- **s.upper()**
- **s.lower()**
- **s.title()**
- **s.capitalize()**
- **s.center()**
- **s.ljust()**
- **s.rjust()**
- **s.strip()**
- **s.lstrip( chars )**
- **s.rstrip( chars )**

String to list:

- **list = s.split( list )**

List to string:

- **s.join( list )** where s is the string to join the elements of list with.

## Assignment

Use **=** to assign a name to a value, e.g. **distance = 48.1**, **name = "Tim Topper"**. Remember that the name has to be on the left hand side of the **=**, i.e. **48.1 = distance** is an error.

### print

Use **print** to display stored values.

```
print list
```

Displays the value of each item in the list. Puts a space between each pair of values. Example: **print "The answer is", 5 + 2, "."** displays:

```
The answer is 7 .
```

Appending a comma to the end of a print statement holds the current output line open, e.g. the code

```
print "The answer is",
print 5 + 2, "."
```

displays

```
The answer is 7 .
```

on a single line.
For more control over output appearance embed formatting codes into output strings. See section 2.2.6.2 String Formatting Operations of the Python Library Reference for the gory details.

## Getting Input

Use **input** to get numerical data from the user,

```
input( string )
```

and **raw_input** to get string data.
Both display string (if given) and then read a line of input, by default from the keyboard. The difference is that **raw_input** just returns the string, while **input** evaluates it as a Python exprssion and returns the result.
Example:

```
distance = input( "Enter the distance in miles: "
)
name = raw_input( "What is your name? " )
```

N.B. the spaces before the second **"** in each case.

### if

Use if to execute one block of code or another, but not both.

```
if test:
    statements
elif test:
    statements
else:
    statements
```

N.B. the **elif** and **else** statements are optional as shown in the first two examples below.
Examples:

```
if x < 0: print x, "is negative"

if flip == 1:
    print "You got heads"
else:
    print "You got tails"

if num < 0:
    print "The number", num, "is negative."
elif num == 0:
    print "The number", num, "is neither positive nor negative."
else:
    print "The number", num, "is positive."
```

### while

Use **while** to execute a block of code multiple times.

```
while test:
    statements
```

Examples:

```
x = 1
while x < 10
    print x
    x = x + 1

num = input( "Enter a number between 1 and 100: " )
while num < 1 or num > 100:
    print "Oops, your input value (", num, ") is out of range."
    num = input( "Be sure to enter a value between 1 and 100: " )
```

### Play again? Repeating a program

```
again = "y"
while again == "y" or again == "Y" or again == "yes" or again == "Yes":

    #
    # Put the body of your program here
    #

    again = raw_input( "Play again (y/n)? " )

print "Thanks for playing"
```

### Lists

Unlike many languages Python provides a built-in list type. A list constant is just a list of items separated by commas and placed inside square brackets, e.g. **`[ "Tim", 42, "Molly" ]`**.

Python provides for a wealth of list operations (complete list in reference manual):

- **`list1 + list2`** : concatenates **`list1`** and **`list2`**
- **`list[ i ]`** : access element number i in **`list`**.
- **`len( list )`** : returns the number of elements in **`list`**
- **`del list[ i ]`** : deletes element number i from **`list`**
- **`list.append( value )`** : appends **`value`** to **`list`**
- **`list.sort()`** : sorts the elements in **`list`**
- **`list.reverse()`** : reverses the order of the elements in **`list`**
- **`list.index( value )`** : returns the position of the first occurrence of **`value`** in **`list`**
- **`list.insert( i, value )`** : inserts **`value`** into **`list`** at position i
- **`list.count( value )`** : returns a count of the number of times **`value`** occurs in **`list`**
- **`list.remove( value )`** : deletes the first occurrence of **`value`** in **`list`**
- **`list.pop()`** : deletes and returns the last value in **`list`**
- **`value in list`** : is **`True`** if **`value`** occurs in list and **`False`** otherwise

N.B. the elements in lists are numbered from 0, **not** 1.

### Text file processing

To read from a file a line at a time:

```
infilename = raw_input( "Name of file to read from: " )
infile = open( infilename, "r" )
for line in infile:
  # Do stuff with line.
  # Remember that line is a string even if it looks like a number,
  # e.g. num = int( line )
infile.close()
```

There's more than this of course. You can also read the entire file into a string in one fell swoop using **`infile.read()`**, read the entire file into a list of strings (one per line in the file) using **`infile.readlines()`**, or read a certain number of bytes using **`infile.read( N )`** where **`N`** gives the number of bytes to read.

To write to a file:

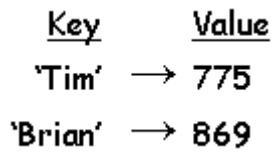
```
outfilename = raw_input( "Name of file to write to: " )
outfile = open( outfilename, "w" )
print >> outfile, ...
outfile.close()
```

For more see the Python library reference on File Objects.

### Dictionaries

Python provides a built-in lookup table type it calls a dictionary (often called hash tables in other languages).

A dictionary constant consists of a series of key-value pairs enclosed by curly braces, e.g. **`d = { 'Tim' : 775, 'Brian' : 869 }`**. This creates a dictionary we can visualize as:




Common dictionary operations include:

- **`d[ 'Tim' ]`** Accessing an element.
- **`d[ 'A-S' ] = 770`** Modifying or inserting a value.
- **`d.has_key( 'Brian' )`** Checking to see if there is a value for a particular key.
- **`d.keys()`** Get a list of all the keys in the dictionary. Often used for iterating through the entries in the dictionary.
- **`d.values()`** Get a list of all the values that occur in the dictionary.
- **`del( d[ 'Tim' ] )`** Delete an entry in the dictionary.
- **`d.clear()`** Delete all the entries in a dictionary.