Python Lesson 2: Basics

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Digital Scholarship and Communications Office (DiSC)

- Unit of the Vanderbilt Libraries
- Support for data best practices (DMP tool, repositories), GIS, copyright, Linked Data (including Wikidata), tools (GitHub, ORCID, Open Science Framework, etc.), and Open Access publishing.
- Offer workshops, consultations, web resources
- Currently offering Python in GIS, R Group, XQuery Text Mining
- More online at: **vanderbi.lt/disc**
- Email: disc@vanderbilt.edu

Object name recommendations

- Be descriptive (what the object is or does)
- Use camelCase. Examples:
  - `bookList`, `alphabetizeParticipants` (lower CC for variables, functions)
  - `DocumentDescription`, `PageHeader` (upper CC for classes)
- Underscore is good for modules and packages:
  - `ordinary_relational_processes`
- Don't ever put spaces in any kind of name, even if you can get away with it.

Simple object types

- string literals. Enclose in quotes. Examples:

  `"lol"`, `'bye bye, birdie'`, `"can't"`

  special characters with backslash: `'\n'`

- number literals (no quotes). Examples:

  `35`

  `0.999`

  `6.02`

- boolean (no quotes):

  `True` or `False`

Assignment to a variable

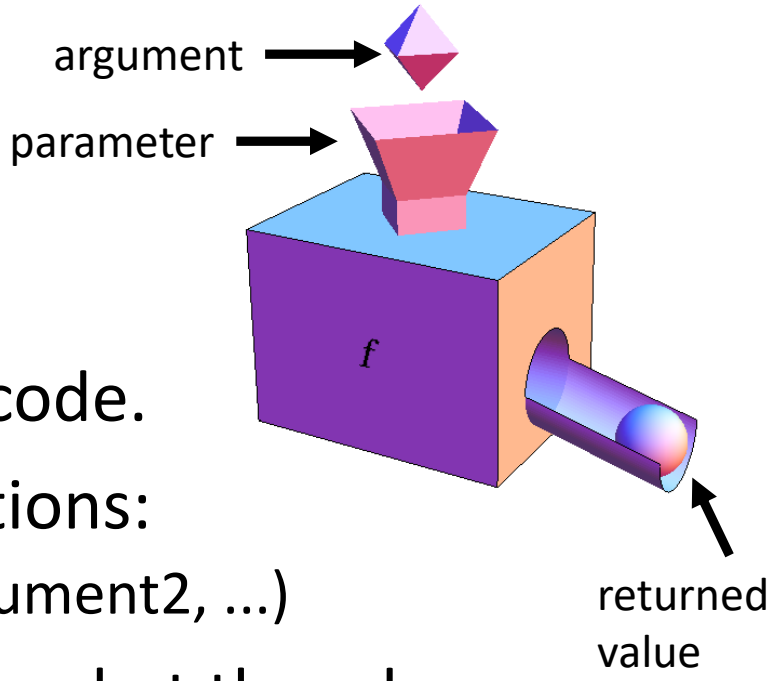
- The equals sign (=) assigns a value to a variable
- It's like a left arrow: ←

```
userName = "smithjr"
isDoorOpen = False
eulersNumber = 2.7182818

userName = lastLoginName
sum = numberWidgets + 3

tooMany = sum > 10
studentCount = studentCount + 1
```

- Variables can store many kinds of objects (not just simple ones like numbers and strings)

Try this…

Functions



- A function defines a block of code.
- We pass arguments into functions:
  - functionName(argument1, argument2, ...)
- It's good to name functions by what they do. Example:

```
myLatte = makeLatte(beans, milk, water)
```

- Functions can be:
  - built-in
  - defined by you in your code
  - defined by somebody else in a module

Try this…

Defining and calling functions

```
# here is where the function is defined
def multiplication(firstNumber, secondNumber):
    answer = firstNumber * secondNumber
    return answer
# here is where the function is called
num1 = 3
num2 = 5
answer = multiplication(num1,num2)
print(answer)
```

parameters

4 spaces standard

arguments

- Notes:
  - The hash (#) character is used for comments
  - Variables used for parameters and arguments can differ
  - Indented code blocks: standard for Python is 4 spaces
  - Don't forget colon before code block!!!
  - About white space elsewhere

Try this…

- Notes:
  - Use a function when you need to repeat a task more than once
  - Use a function to keep your code in small enough blocks that it's easy to understand what's going on (importance of naming!)
  - Is it better to pile up functions inside of functions (compare first and second example)?

Modules (how)

- reusable code stored in a separate file (has **`.py`** extension like other Python programs)
- loaded into script using **`import`** statement
- dot notation for indicating a function is from a module (don't need the **`.py`** extension)

```
import simple_math
sum = simple_math.addition(num1, num2)
```

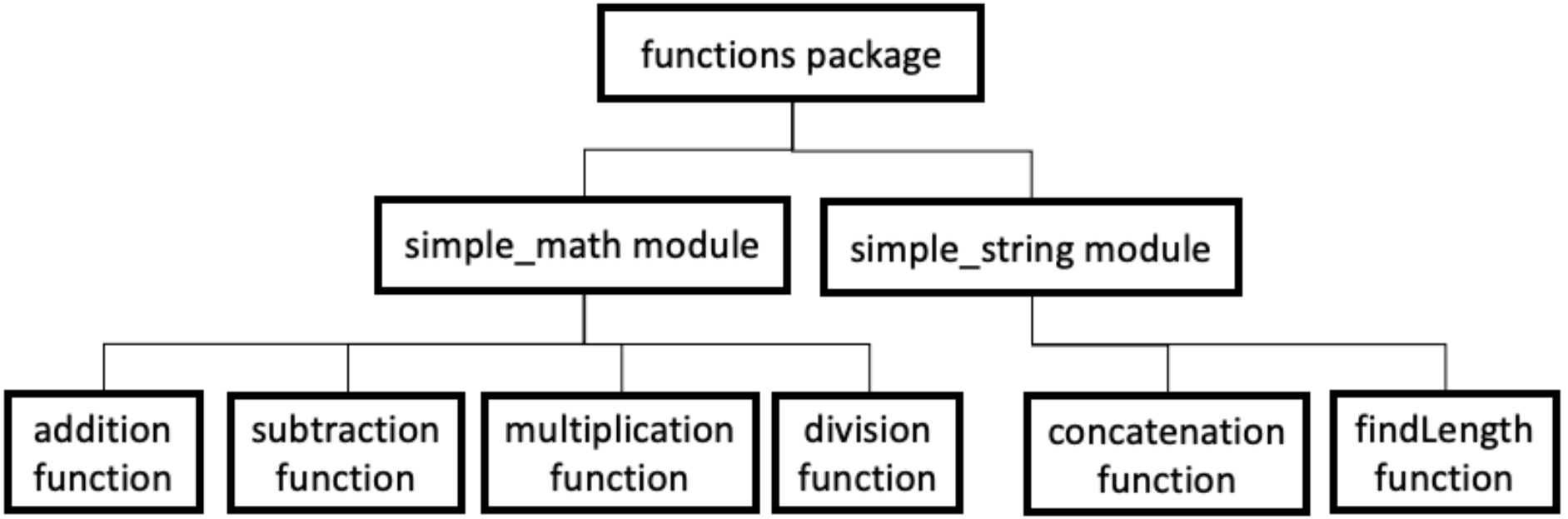
- abbreviating module names:

```
import simple_math as m
sum = m.addition(num1, num2)
```

Modules (where)

- some modules are part of the **standard library** (part of every Python installation)
- modules NOT in standard library must be loaded using a package manager (PIP for command line, GUI Tools menu on Thonny)
- Anaconda has most libraries already loaded
- You can make your own modules (but probably won't)
  - about the file name gotcha!

Packages (what)



- Packages are a high-level organizational tool for grouping related modules.
- Hierarchical dot notation:

```
package.module.function()
```

Packages (how)

- abbreviating module names:

```
from functions import simple_math
import functions.simple_string as st

answer = simple_math.subtraction(10, 3)
print(answer)

firstName = 'Donald'
lastName = 'Duck'
combinedString = st.concatenation(firstName,
lastName)
print(combinedString)
```

- There are linked DIY instructions if you want to try making your own packages and modules

`Input` function

- Example:

```
name = input("What's your name? ")
print('Hello ' + name + '! How are you?')
```

- Content comes in as a string, so conversion is required if you want to input numbers. See example.

Conditional execution (Try this)

```
name = input('What is the name of the character? ')
isMicky = name == 'Mickey Mouse'
print(name)
print(isMicky)

if isMicky:
    print('You are a Disney character')
print('That is all!')
```

- The comparison operator (==) is different from the assignment operator (=) and produces a boolean.
- The **`if`** statement evaluates a boolean
- If **`True`**, the following indented code block is executed. (Don't forget colon!). Same indent is always executed.
- Notice how I named the variable to make the code readable.

`else` and **`elif`**

- **`else`** defines the default code block if no condition is satisfied.
- **`elif`** combines **`else`** and **`if`**; use to check additional conditions.
- Python does NOT have the **`switch-case`** structure common in other languages.

Try this…

- Examine and try **`if`**…**`else`**… and **`if`**…**`elif`**…**`else`**… examples.
- Notice how indentation is used to control which code blocks are conditionally executed and which ones are always executed.
- Notice that the program is really dumb. It only does what you say and doesn't really have any idea what a Disney character is.