

Geo1000 – Python Programming – Assignment 0

Due: Monday, September 11, 2023

Introduction

This handout is to get you started and make your first steps of programming with Python. Helping each other is fine. Try to make sure that your implementation (i.e. the program you make) is your *own*.

This is an ungraded assignment that will not count for your final grade. The results do not need to be handed in. However, we ask you to check your results with one of your fellow students during the first lab session and to discuss the results you obtained. Did you get the same answers? Did you do the same things?

Once you have a working environment on your own laptop (and did this Assignment), you can start working on Assignment 1.

1 Installing Python, PyCharm and Using the Interactive Console

You are expected to install Python and PyCharm on your own laptop and make some first steps with the language.

1.1 Installing Python and PyCharm

For the Python course we will be using the official Python 3.x distribution from the Python website: <http://python.org/>.

At the Python website you can also find a myriad of information about Python and the official documentation about the language (<https://docs.python.org/3/index.html>). To get an in-depth and rather formal explanation of the Python programming language, you can take a look at the Python Language Reference (<https://docs.python.org/3/reference/index.html>). A more informal introduction can be found in the Python tutorial (<https://docs.python.org/3/tutorial/index.html>).

As Integrated Development Environment (IDE), we will be using PyCharm. It is available from the website: <https://www.jetbrains.com/pycharm/download/>. The developers of PyCharm have made available a lot of documentation on how their product works, which you can find at: <https://www.jetbrains.com/pycharm/learn/>.

To help you install the software, some manuals were produced by AdHok (ICT support for students in the Faculty of Architecture). If you are using *Windows* as your computing platform, you follow this manual:

<https://adhok.bk.tudelft.nl/wp-content/uploads/2022/01/PyCharmCommunity-1.0-Windows-EN.pdf>

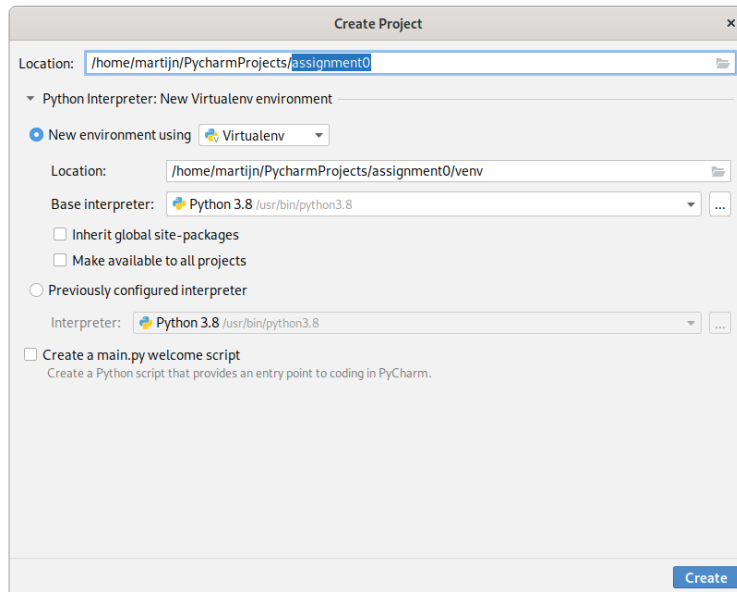
If you are using a *Mac*, you follow this manual:

<https://adhok.bk.tudelft.nl/wp-content/uploads/2022/01/PyCharmCommunity-1.0-macOS-EN.pdf>

1.2 Exercising with Python's interactive console

After installation of both Python and PyCharm, start PyCharm.

Now create a new Python project named 'assignment0':



Subsequently, start Python's interactive console (click on: Python Console) to perform the following exercises.

1. Simple Commands.

Type the following one-line commands into Python's interactive console, each time followed by pressing "Enter" to see the output:

- `credits`
- `copyright`
- `help()`
- `math`
- `quit`

2. Simple Expressions.

Type one-line commands to the console to compute the following:

- `12345 + 23456`
- `98765 - 12345`
- `128 * 256`
- `555 / 111`
- `(18 - 32) * 5 / 9`

- $-10 * 9 / 5 + 30$
- $22 / 7$
- $22.0 / 7.0$

Did these expressions all give a result you had expected? Use a `print` statement to show your answer (as string) in the interactive console.

- (a) Create an expression that uses the sum operator (+) to sum the individual digits of your student number (as integers).
 - (b) Create an expression that multiplies all the digits of your student number (as integers).
 - (c) Create a variable name to which you assign your name as string.
 - (d) Create a variable age to which you assign your age as floating point number.
4. Convert between degrees Celsius and degrees Fahrenheit.

Convert temperatures from one system to another. The following two formulae convert between °C (Celsius) and °F (Fahrenheit).

- $^{\circ}\text{C} \times \frac{9}{5} + 32 = ^{\circ}\text{F}$
- $(^{\circ}\text{F} - 32) \times \frac{5}{9} = ^{\circ}\text{C}$

Conversion constants: $32^{\circ}\text{F} = 0^{\circ}\text{C}$, $212^{\circ}\text{F} = 100^{\circ}\text{C}$.

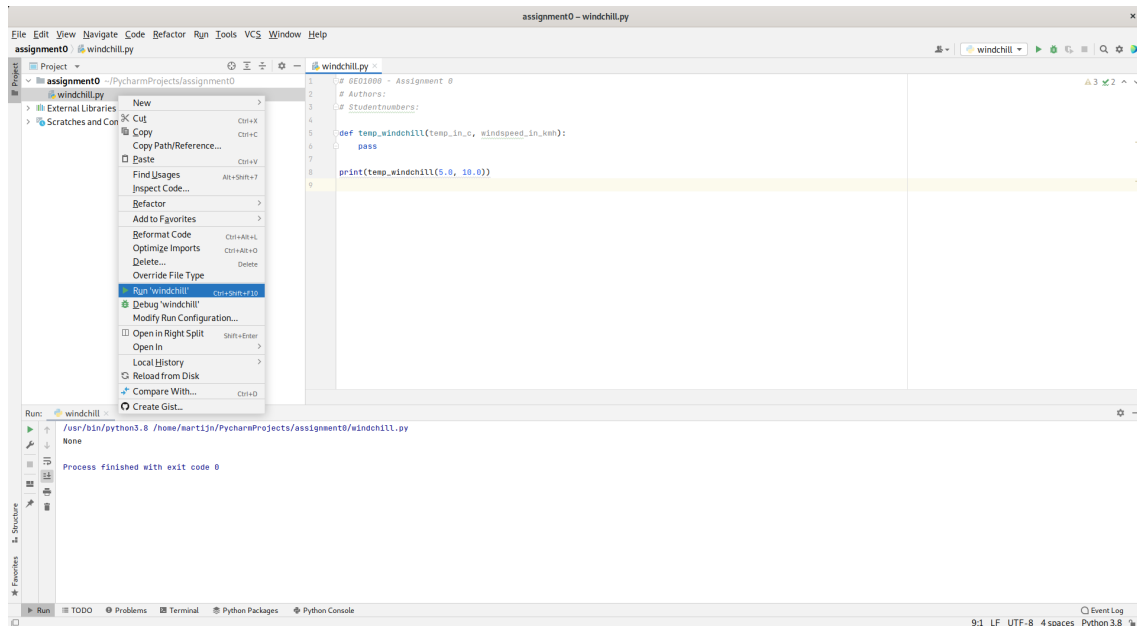
Use the two variables *celsius* and *fahrenheit* to assign the values for the conversion.

- (a) Create a statement to convert 18 °C to °F.
- (b) Create a statement to convert -4 °F to °C.

2 Using Python in script mode: Wind chill factor – windchill.py

You are expected to create a small Python program. Note, before working on this part of the assignment, make sure you have read the Think Python book upto and including Chapter 3 (Functions).

You should start with the file `windchill.py`, which can be downloaded from Brightspace. You should put the file `windchill.py` into the folder of the project assignment0, which PyCharm has created for you. Once, you have copied the file into the project folder, you should be able to see the file `windchill.py` in PyCharm, and you are ready to add your source code into the file. If you right click on the file name 'windchill.py' in the project tree and click on the option 'Run windchill', Python will run that script for you.



Write a function that prints the wind chill temperature for a combination of a temperature in $^{\circ}\text{C}$ and a wind speed in kilometer per hour. The formula to calculate the wind chill temperature (T_{wc}) is

$$T_{wc} = 13.12 + 0.6215 \times T_a - 11.37 \times V^{0.16} + 0.3965 \times T_a \times V^{0.16},$$

where parameter T_a is the temperature (measured in $^{\circ}\text{C}$ at 1.5 meters above the ground) and parameter V is the windspeed (in km/h on a height of 10 meters above the ground).

Use the following skeleton for `windchill.py`, in which you replace the `pass` statement with your implementation. Python keyword `pass` is a placeholder for future code; see <https://docs.python.org/3/tutorial/controlflow.html#pass-statements>

```
# GEO1000 - Assignment 0
# Authors:
# Studentnumbers:

def temp_windchill(temp_in_c, windspeed_in_kmh):
    pass

temp_windchill(5.0, 10.0)
```

Also, calculate the wind chill temperature for a temperature of -1°C and 35 km/h.

3 Note for future reference

If you want to extend Python with additional packages, you can use pip: <https://pip.pypa.io/en/stable/>.

You can also install packages from within PyCharm: <https://www.jetbrains.com/help/pycharm/installing-uninstalling-and-upgrading-packages.html>.