COMP7023 Python Programming

Worksheet 1

If you do not want to use the PCs provided by the University, then install the latest release version of Python on your computer by following the instructions on `https://www.python.org`. If you are unfamiliar with installing software, then the detailed instructions on `https://wiki.python.org/moin/BeginnersGuide/Download` may be helpful. You may already have Python on your computer; then just ensure it is at least version 3.8.

You can use the Python REPL for the first three exercises, but for the latter exercises it is more convenient to create a Python program using `IDLE`.

1. Which value (or object) does each of the following expressions evaluate to? Think first of your answer, before you enter the expression into the REPL and check. Think about unexpected results.

   (a) 2 * 3 + 1
   (b) 2 * 3+1
   (c) 1 + 2
   (d) 1 + 2 * 3
   (e) 0.1 + 0.2 + 0.3
   (f) 0.3 + 0.2 + 0.1
   (g) 0.1 + (0.2 + 0.3)
   (h) 3 * 0.1
   (i) 1/3 * 3
   (j) min(pow(2,3), pow(3,2))
   (k) abs(round(pow(-2,5) / 5))
   (l) round(pow(10, 30) / 10)
   (m) ”hello” + ’ ’ + ”world”
   (n) ”hello”[3]
   (o) ”hello”[-1]
   (p) ”hello”[8]
   (q) ”hello”[2:]
   (r) ”hello”[-1::-3]
   (s) len(”hello”[2:4])

2. For each of the values you obtained in the preceding exercise, what is its type?

3. (a) Create 5 different expressions that evaluate to `2025`, using only numeric literals, the operators `+`, `-`, `*` and parentheses. Enter them into the REPL to check that they are correct.

   (b) Create 5 different expressions that evaluate to `"abba"`, using only string literals, the operators `+` and `*`, slicing and parentheses. Enter them into the REPL to check that they are correct.

   (c) Use slicing to obtain from the string literal `"hello"` the strings `"hell"`, `"lo"`, `""`, `"o"` and `"olleh"`.

4. Start writing a Python program with

```
from math import pi
radius = 10
circle_circumference = 2 * pi * radius
height = 20
```

   Find formulas for the volume and surface area of a cylinder and a cone (web search or ask an LLM). Then extend the program to calculate the volume and surface area of a cylinder and a cone of the given radius and height, binding also intermediate values to meaningful names.

5. The previous Python program calculates with fixed values for radius and height. To easily calculate the various volumes and areas for differently sized cylinders and cones, define functions with appropriate formal parameters that calculate these values. The program can start with

```
from math import pi, sqrt

def circle_circumference(radius):
    return 2 * pi * radius
```

6. *** Define the following functions that take one string as formal parameter:

   (a) A function `head` that returns the first character of a string.

   (b) A function `tail` that returns the given string without its first character.

   (c) A function that also takes a number n as second formal parameter and returns the nth character of the string, but counting characters starting at 1 (so for `"Python"` and `3` it should return `"t"`).

   (d) A function that reverses the given string (so `"Python"` becomes `"nohtyP"`).