Universität Bremen

M.Sc. Neurosciences

# Module MN-F3: Programming

## Exercises #1 / Tutorial on 23.10.2025

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## 1 Finger-flexing

a) Compute the mathematical expressions

$$\frac{42^3 + 17}{\frac{3}{8} - 14^{1/2}}$$

$$\sqrt{\sin(\cos(\tan(0.524)^{\log(18)}))}$$

b) Write some code that...

- ...lets the user enter a number, and prints the cube and the square of that number with a single `print`-command.
- ...lets the user enter two strings like "Aber" and "witzig", concatenates these strings, and prints the result.
- ...lets the user enter a number, and uses a logical expression that prints `True` if that number is either 1, 17, or 42, and `False` else.

## 2 Quadratic equation solver

It is now time for the computer to do what you did 'by hand' in the Math Prep Course.

The general form of a quadratic equation is

$$ax^2 + bx + c = 0 \quad .$$

Write a program that takes the coefficients $a$, $b$, and $c$ as inputs, computes the two solutions for the unknown $x$ and assigns them to new variables, and finally prints these results rounded to three digits after the decimal point.

## 3 Some more finger-flexing with lists and tuples

a) Generate a list with integer numbers from 4321 to 1234 in steps of -42, and print the last item in that list.

b) Generate a new list by reversing the order of the elements in the list. Print the number of elements in the list, and the value of the last item in that list.

c) Substitute the first 42 elements in the list with the integer numbers from 1 to 42. Print all items in the list with a single print-command.

d) Create three lists with the values `1, 2, 3` and `4, 42, 6`, and `7, 8, 9`, respectively. Create a list named `list_of_list` of these three lists. What do you obtain if you issue the following command `print(list_of_list[1][1])` ?

e) Create a variable with a list of integer numbers from 10 to 17. Replace the numbers starting from 12 with the first three elements of a tuple that contains the values 'This', 'is', 'absolutely', and 'incredible'. Then try to replace the last element of the tuple with the string 'impossible'. Check your results by printing the items of the changed list and tuple.

## 4 Find the errors!

Inspect the following code and find both syntax errors and logical errors. In total, there are about 15 of those glitches (depends a little bit on how you count them...):

```
v_rest = input('Enter the resting potential in Volts: ')
print(f'The resting potential is {v_rest/100} millivolts.")

height-building = 10   % in meters
length-shadow = 1   % also in meters
print(f"The angle of the sun over the horizon is: " \\
      "{{atan(length-shadow/height-building)/pi*90}} degrees.")

c = math.sqrt(a*a+b**3)
a = 4.0
3.0 = b
print(f"{a} is the length of the hypotenuse")
print(f'in a right-sided triangle with side lengths {b,c}.')
```