PHOT 110: Introduction to programming

Practical 3: Conditional Statements and While Loops

Michaël Barbier, Spring semester (2024-2025)

1. Conditional Statements

1.1 Verify an age

Prompt the user to give his year `y` of birth. Print "You can join our drawing contest." if he/she is born in 2020 or afterwards. In the case the user is too old, print "Unfortunately, only children born in 2020 and later are eligible for our drawing contest.". Example input/output of the script:

```
Please provide your year of birth: 1998

Unfortunately, you are too old for our drawing contest.
```

1.2 Water bill in Istanbul

Prompt the user for the montly usage of water in cubic meters. Print the amount that he/she will have to pay for his/her water bill. The price per cubic meter depends on the water consumption per month:

- Up to 15 cubic meters: 37.92 per cubic meter,
- 16 to 30 cubic meters: 57.78 per cubic meter,
- 31 cubic meters and above: 83.55 per cubic meter.

```
Water consumption per month (in cubic meters): 29

You have to pay 1675.62 TL
```

2. While loops

2.1 Squares

Print the squares of increasing integers from 1 to N to the console. Create a parameter for N and use a loop. The output should look as follows:

```
The square of 1 = 1
The square of 2 = 4
The square of 3 = 9
The square of 4 = 16
The square of 5 = 25
The square of 6 = 36
The square of 7 = 49
The square of 8 = 64
The square of 9 = 81
The square of 10 = 100
```

2.2 Fibonacci series

Print the series of Fibonacci which is given by:

$$F_n = F_{n-1} + F_{n-2}$$

with initial values $F_1 = 1$, $F_2 = 1$. Stop when $F > 1000$. The output should look as follows

```
F = 2
F = 3
F = 5
F = 8
F = 13
F = 21
F = 34
F = 55
F = 89
F = 144
F = 233
F = 377
F = 610
F = 987
F = 1597
```

2.3 Buying candy

A child buys candy until his/her money (25) is finished. Prompt the child repetively what it wants to buy with the following options:

- [1] A lollipop: 5
- [2] Chocolate bar: 12
- [3] Chocolate Wafer: 7
- [4] Chips: 20

Stop the script when the child has less than 5 left. Example output:

```
You have 25 TL left, what do you like to buy?
[1] A lollipop: 5 TL, [2] Chocolate bar: 12 TL, [3] Chocolate Wafer: 7 TL, [4]
Chips: 20 TL
Choose 1-4: 3


You have 13 TL left, what do you like to buy?
[1] A lollipop: 5 TL, [2] Chocolate bar: 12 TL, [3] Chocolate Wafer: 7 TL, [4]
Chips: 20 TL
Choose 1-4: 2

You can't afford more candy, enjoy!
```

2.4 Velocity of a skydiver

When an object falls it accelerates initially with $g = 9.81$ m/s^2. When we take the air resistance into account, this acceleration decreases with increasing velocity and leads to a stable velocity after a while. Following formula gives the downward acceleration a:

$$a = g - kv^2/m$$

where $k = 0.24$ kg/m, and the skydiver weighs $m = 70$ kg.

Calculate and print the velocity v at every second and stop when the velocity does increase less than 1 m/s in a second (so acceleration is less than 1 m/s^2). Start with an initial downwards velocity $v = 0$ and an initial downwards acceleration $a = 9.81$. The script should provide you with following output:

```
Velocity = 9.81 m/s
Velocity = 19.290047657142857 m/s
Velocity = 27.824255867606254 m/s
Velocity = 34.97989284616847 m/s
Velocity = 40.59471717692472 m/s
Velocity = 44.75466781918355 m/s
Velocity = 47.69730681939339 m/s
Velocity = 49.70719340971333 m/s
Velocity = 51.045861718271105 m/s
```