

Scientific Programming (Wissenschaftliches Programmieren)

Exercise 2

1. Fibonacci numbers (#3)

- Create a function `fibonacci()` which generates Fibonacci numbers.
- The function should take the number of desired Fibonacci numbers as argument and return those Fibonacci numbers as a list.
- Make sure it also works correctly, when the requested number of Fibonacci terms is only one or two.

Hint: The first two elements of a Fibonacci series are 1, all other elements are the sum of the previous two elements: 1, 1, 2, 3, 5, 8, 13, ...

2. Aligned printing of ordered numbers

- Create a function `print_ordered_ints()`, which takes a list of ordered integers (e.g. as generated by the `fibonacci()` function) and prints them aligned, indicating their position in the list.
- Example: `print_ordered_ints(fibonacci(15))` should result in:

```
1: 1
2: 1
3: 2
4: 3
5: 5
6: 8
7: 13
8: 21
9: 34
10: 55
11: 89
12: 144
13: 233
14: 377
15: 610
```

Hint: The expression evaluation in f-strings can be nested, e.g. `f"{value:{width}d}"` would print the result of the expression `value` as integer with a field width obtained by evaluating the expression/variable `width`.

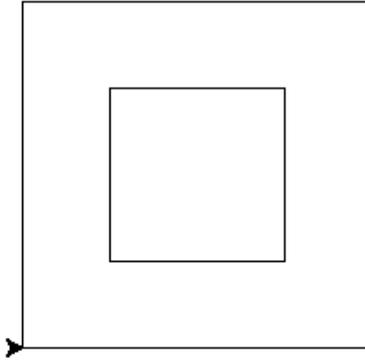
Hint: To find out the maximal printed length of a number, you can convert it to a string and determine the length of the string.

3. *Path plotting

- Create a function `plot_paths()`, which takes a list of paths as argument and plots lines between the points of each path (e.g. via turtle graphics).
- Each path is a list of xy-coordinate tuples. The plotting should start at the first point of the path, and connect all subsequent points in the path. Points between different path should not be connected.

Example:

```
paths = [(-50, -50), (50, -50), (50, 50), (-50, 50), (-50, -50)],  
        [(-100, -100), (100, -100), (100, 100), (-100, 100), (-100, -100)]  
plot_paths(paths)
```



- Create a function `vasarely_star_paths()`, which takes the nr. of grid points and a grid distance as two arguments and returns a list of paths, which can then be used to draw the corresponding Vasarely-star.
- Test, the returned path list with the `plot_paths()` function.

Example:

```
plot_paths(vasarely_star_paths(10, 20))
```

