

## Chapter 5: while loop

### Exercise 1

Write a while loop which print numbers from 0 to 20 in increasing order without using the instruction if:

```
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```

Same question but in decreasing order:

```
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```

### Exercise 2

What is the below program doing?:

```
a, b, c = 1, 1, 1
while c < 11 :
    print(c, ":", b)
    a, b, c = b, a+b, c+1
sage: # edit here
```

### Exercise 3

Using a while loop, write a function `orbit_product_of_digits(n)` which returns the list of successive iterations of the function which returns the product of digits, that is, `[n, product_of_digits(n), product_of_digits(product_of_digits(n)), ..., z]` until a computed number `z < 10` is reached that can be written with only one digit:

```
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```

Can you find a number  $n$  such that the length of the orbit is larger than 5?:

```
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```

... larger than 10?:

```
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```

### Exercise 4

The Taylor series of  $\sin(x)$  is

$$\sin x = \lim_{n \rightarrow \infty} \sum_{k=0}^n \frac{(-1)^k}{(2k+1)!} x^{2k+1} = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \dots$$

Write a function `taylor_sin(x)` which evaluates the Taylor series neglecting the terms of the sums that are less than  $10^{-5}$  in absolute value:

```
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```