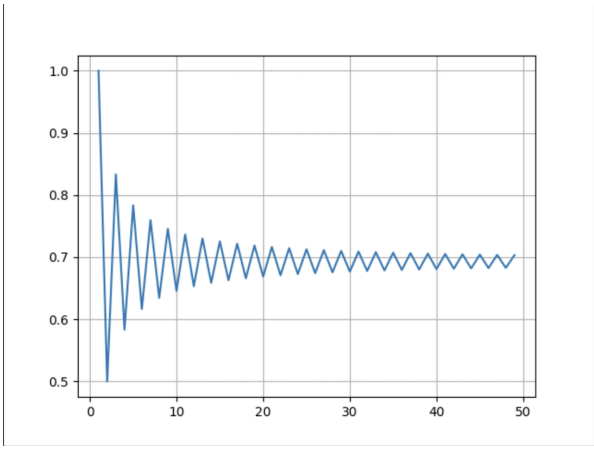
Assignement 4 - Python

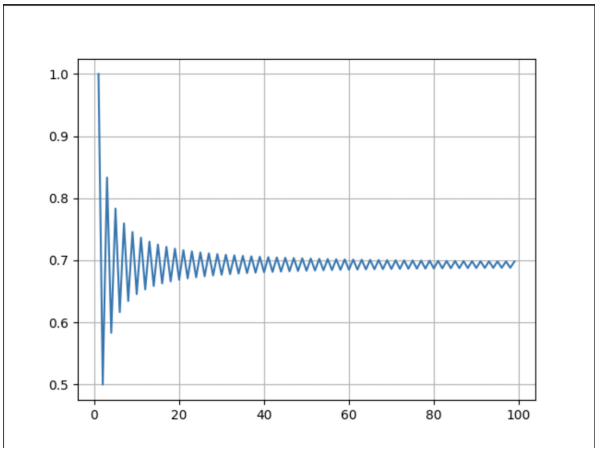
```
import math

import numpy as np
import matplotlib.pyplot as plt
# MARA IELCIU

# ploting the alternating harmonic series
t = np.arange(1, 10000, 1)
series = (-1) ** (t + 1) / t
ampli = np.cumsum(series)

plt.plot(t, ampli)
plt.grid()
plt.show()

# checking if we get the same result by changing
# the order in which we add the terms
# we add the negative terms and the positive terms separately
# then we compute the final sum
sum_even = 0
sum_odd = 0
for i in range(1,10000):
    if i%2 == 0:
        sum_even = sum_even + 1/i
    else:
        sum_odd = sum_odd + 1/i
total_sum = sum_odd - sum_even
print(total_sum-math.log(2))
```

We observe that the sum converges to ln(2)

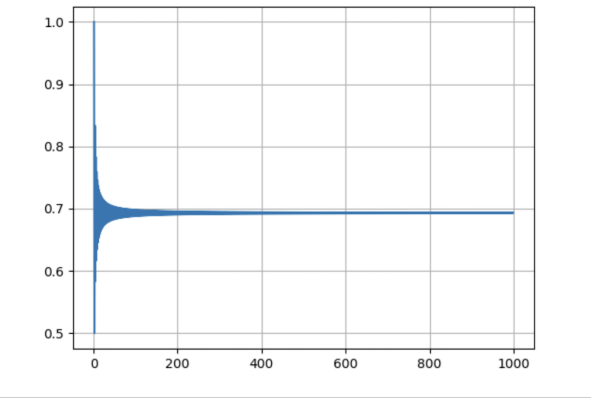
This is what the graph looks like when the np.range has the following arguments:

- t = np.arange(1, 50, 1)
- t = np.arange(1, 100, 1)

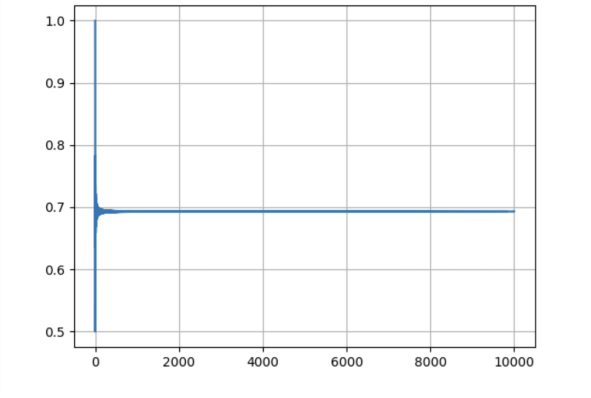




- t = np.arange(1, 1000, 1)



- t = np.arange(1, 10000, 1)



In this part of the code, we print the difference of the sum in which we changed the order of the terms and the initial result of the initial sum that converges to ln(2). The difference is not 0.

```
sum_even = 0
sum_odd = 0
for i in range(1,10000):
    if i%2 == 0:
        sum_even = sum_even + 1/i
    else:
        sum_odd = sum_odd + 1/i
total_sum = sum_odd - sum_even
print(total_sum-math.log(2))
```

main.py

```
15
16  sum_even = 0
17  sum_odd = 0
18  for i in range(1,50):
19      if i%2 == 0:
20          sum_even = sum_even + 1/i
21      else:
22          sum_odd = sum_odd + 1/i
23  total_sum = sum_odd - sum_even
24  print(total_sum-math.log(2))
25
26
27
28
```

for i in range(1,50)

main

```
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0.010099980015972565

Process finished with exit code 0
```