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|  | DEPARTMENT OF MECHANICAL ENGINEERING | Student name: Student ID Number: | Signature: |
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CS106 Basic Computer Science and Programming - 2022-2023 – Spring

Midterm Exam

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| Instructor: Özgür Günelisu, Timuçin Eriş Date/Time: 26.05.2023 / 11.00 Duration: 75 min | Exam Rules: <ul style="list-style-type: none"> Do NOT communicate in any way with any person other than the instructor during the examination! You can use your previously written codes. |
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SAVE ALL FILES INTO THE FOLDER 'MT_2X02030XX'
 AT THE END, COMPRESS THE FOLDER (right click / send to / compressed (zipped) folder)
 UPLOAD 'MT_2X02030XX.zip' TO TEAMS

Q1. (40p) Save as 'q1'.

Write a general code that finds the sum of a series. The series should be calculated for the given tolerance, but not more than the maximum number of terms, nmax. The aim of the code is to limit the runtime by nmax if the given tolerance is too small.

$$\sum_{n=1}^{\infty} \frac{a^n (2n + 0.4)}{k^{(2n+1)}} \quad \text{where } a = 0.88, k = 1.27$$

Test your code with the given (Tol & nmax) inputs.

```
a = 0.88;
k = 1.27;
Tol = 1e-3;
nmax = 80;
toplaml = ...;
...
...
```

```
a = 0.88;
k = 1.27;
Tol = 1e-5;
nmax = 25;
toplaml = ...;
...
...
```

toplaml:
4.538222153910229

toplaml:
4.539432112978898

Q2. (60p) Save as 'q2'.

A code will be written to perform the following task:

1-) Select even and odd numbers in a given list (**A**) of any size and store even numbers in a list (**ciftler**) and odd numbers in a list (**tekler**).

2-) Find the average (arithmetic mean) of the elements of list **A**.

3-) Show the number of elements and average on the screen (console) with two nice sentences such as:
 Given list has XX elements.
 The average of the elements list is XX.XX.

4-) Change the elements of list **tekler**, taking the square of the elements which are greater than the average and the square root of the elements which are smaller than the average.

DO NOT IMPORT ANY MODULES.

You can test your code with the following lists. Start your code with the lines below.

```
A = [6, -5, 9, 20, 8, -10, 21, 7]
#A = [6, 5, 9, 15, 8, 12, 21, 3, 168, 59, 43]
#A = [-4, -5, 9, 5, -7, -14, -27, 3]
...
```

Results for the given lists, respectively.

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|----------------|--------------------------------------|--------------------------------|
| Variable List: | A | [6, -5, 9, 20, 8, -10, 21, 7] |
| | ciftler | [6, 20, 8, -10] |
| | tekler | [25, 3.0, 4.58257569495584, 7] |
| Console: | Given list has 8 elements. | |
| | The average of the elements is 7.00. | |

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| Variable List: | A | [6, 5, 9, 15, 8, 12, 21, 3, 168, 59, 43] |
| | ciftler | [6, 8, 12, 168] |
| | tekler | [25, 81, 225, 441, 9, 7.681145747868608, 6.557438524302] |
| Console: | Given list has 11 elements. | |
| | The average of the elements is 31.73. | |

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| Variable List: | A | [-4, -5, 9, 5, -7, -14, -27, 3] |
| | ciftler | [-4, -14] |
| | tekler | [-5, 3.0, 2.23606797749979, 49, 729, 1.7320508075688772] |
| Console: | Given list has 8 elements. | |
| | The average of the elements is -5.00. | |