

Homework 02

Prerequisites: read help about 'plot', 'linspace', and 'print'. Do not forget about test cases.

Problem 1 (4 points)

Plot the function $f(x) = \exp(-x^2/10) * \sin(x)$ for 400 linearly spaced points of x in the region from 0 to 2π . Points should be joined with solid lines.

Do not use any cycles or loops. Include the resulting figure in your report.

Problem 2 (4 points)

Plot functions x^2 and $x^3/2 + 0.5$ for 100 linearly spaced points of x in the region from -1 to $+1$. x^2 should be red solid line and x^3 should be black dashed line. Do not worry about black and white printouts as long as colors are present in pdf report file.

Do not use any cycles or loops. Include the resulting figure in your report.

Problem 3 (3 points)

Write a script which calculates

$$1 + \sum_{i=1}^N \frac{1}{x^i} \quad (1)$$

for $N = 10$ and $x = 0.1$

Use loops as much as you wish from now.

Problem 4 (3 points)

Write a script which calculates

$$\sum_{i=1}^N \frac{1}{i} \quad (2)$$

for $N = 100$, $N = 1000$, $N = 10000$.

Is the sum converging to certain value? What is it?

Bonus (2 points): What is value of the sum for $N \rightarrow \infty$ and why is it so drastically different from numerical results?

Problem 5 (3 points)

Write a script which calculates for $N = 100$.

$$S_N = \sum_{k=1}^N a_k \quad (3)$$

where $a_k = 1/k^{2k}$ for odd k and $a_k = 1/k^{3k}$ for even k .

Hint: you may find **mod** function useful to check for even and odd numbers.

Problem 6 (3 points)

Make a plot of S_N from problem 5 as a function of N where N spans the range between 50 and 150. Mark plot points with circles and make **no lines** connecting points.