Mathematical Fundamentals for Electrochemical Energy Storage Systems

Exercise 1

Task 1: Taylor Series approximation using Python

a. Write a program in python that finds the Taylor series expansions of the following mathematical functions at the point and the degree given below.
   i. $f(x) = \cos(x) + \sin(x)\ at\ x = 0.5\ and\ degree = 4$
   ii. $f(x) = \ln(x)\ at\ x = 0.5\ and\ degree = 5$
   iii. $f(x) = -\frac{1}{x+1}\ at\ x = 0.5\ and\ degree = 3$

b. Compare the Taylor series approximations with the actual functions by plotting them using matplotlib. Use individual figures for individual functions

c. (Bonus) Is there way to perform the Taylor series expansions for the functions given above at any arbitrary point and for any arbitrary degree?