Exercise 1: Reviewing High School Knowledge: Analytical Optimization

Summer Term 2024

This exercise reviews some very fundamental optimization issues, which you have already studied in school and during your first semesters.

Review: Review the terminology that we have discussed in the class:

1. Please, provide two different definitions of a maximum (and minimum, respectively):

2. What is the difference between a minimization and a maximization task?

To Do: Please, locate the optima of the following three one-dimensional functions. In so doing, discuss whether your solutions are minima or maxima. What are the particular characteristics and/or problems of the four functions?

Tasks: Please consider the following problems:

1. $f(x) = 5x^2 - 2x + 10$
2. $g(x) = x^3 - 6x^2 + 12x - 7$
3. $h(x) = (x^2 - 8x + 16)(x - 1)$
4. $i(x) = \sin(x)$

Have fun, Theo and Ralf.