deep se
dependable evolvable pervasive software engineering group

Exercise Session – Gradient Descent

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Goal

Provide the implementation of **gradient descent** algorithm for **polynomial functions**

$$f : \mathbb{R} \rightarrow \mathbb{R}$$

$$f(x) = a_0 + a_1 x + a_2 x^2 + \ldots + a_n x^n = \sum_{k=0}^{n} a_k x^k$$

Gradient Descent algorithm

- Find the minimum of `f` in a given interval `[inf,sup]`
- Start from a given initial point `x0`
- Next candidate:

$$x_i = x_{i-1} - \delta f'(x_{i-1})$$

where δ is a given constant

Required methods

- `solve`, that finds the minimum of `f` in `[inf,sup]`
- `solve_multistart`, that randomly picks an initial point in `[inf,sup]` at each iteration
- `solve_domain_decomposition`, that performs multistart after having split `[inf,sup]` in a given number of subintervals