

IM 60002: Advanced Decision Modeling
Homework Assignment # 2
Due Date: Apr 2nd 2025

Consider the following problem

$$\text{minimize } f(x_1, x_2) = (x_1^3 - x_2)^2 + 2(x_2 - x_1)^4$$

Develop codes (Matlab/python/C++) to solve the above problem (starting from the point (2, 0)) using each of the following methods.

- Cyclic Co-ordinate method
- Method of Steepest Descent
- Newton's method

- 1) Do the methods converge to the same point?
- 2) Compare results obtained using each method.
- 3) For each method consider following two stopping conditions and explain the differences, if any, in the results obtained
 - a) $\left| \frac{f_{k+1} - f_k}{f_k} \right| \leq 0.001$
 - b) $|x_{k+1} - x_k| \leq 0.01$

Assume any missing values/parameters.

Submission

You need to submit a report consisting of outputs, graphs, and any parameter tuning. If you cannot develop the code, I would strongly recommend you attempt with other means, i.e., by hand or Excel. Do not use existing libraries available on the internet.