

TMA947 / MMG621 — Nonlinear optimisation

Exercise 4 – Unconstrained optimization

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E4.1 (easy) Consider the following problem

$$\text{minimize } \mathbf{x}^T A \mathbf{x},$$

where $A = \begin{pmatrix} 0.5 & 2 \\ 0 & 0.5 \end{pmatrix}$. Let $\mathbf{x}^0 = (0, -1)^T$.

- (a) Starting at \mathbf{x}^0 , perform one step of steepest descent with exact line search.
- (b) Starting at \mathbf{x}^0 , perform one step of Newtons method with exact line search.
- (c) What is the global optimal solution? Have any of the methods reached this? What do you think that the next step of the methods would yield? Which method performs best on this problem.
- (d) Draw the function in MATLAB together with the points obtained after one iteration of each method.