

Optimization in Machine Learning (ACM 40990)

Dr Lennon Ó Náraigh

Trust-Region Methods

Instructions:

- This is a graded **bonus** assignment.
- Worth a maximum of 5%.
- Can be completed individually or as part of a group. In case of group submissions, the homework should be submitted with a statement outlining the contribution of each group member. The group members should each sign the statement.
- Web resources (including code repositories and large language models) can be used. Give credit to the source if web resources are used. Be extra careful with large language models as the results are sometimes presented to the user with apparently great confidence, and at the same time, wrong.
- The format of the completed assignment should be a 1-2 page report, **in Latex**. In addition, a printout of the codes (fully commented) should be included in an appendix.
- The submission is by hardcopy, to the homework box outside the School Office in Room S3.04, Science Centre South.
- Because this is a bonus assignment, there is no guarantee of feedback by any particular date.
- Due date: Tuesday March 26th (5 pm Irish Time).

Complete Question 2 on Exercises #3, that is:

2. Write a code (in whatever programming language) that uses the Trust-Region method (Dogleg method) to solve the Rosenbrock problem

$$f = 10(x_2 - x_1^2)^2 + (1 - x_1)^2.$$

The results should be written up in the form of a one-page report (modelled on the computational exercises to date). For maximum marks, the report should describe the convergence of the method and include a contour plot showing the trajectory of the iterative method as it converges to the solution. Include codes (fully commented) in an appendix.