Department of Mathematics, IIT Madras

MA-5895-Numerical Optimization

Problem Sheet 3

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Q. 1 Explain how the dogleg step is better than the Cauchy point, for a trust region method.

Q. 2 Given a $n \times n$ matrix A, if A is positive definite, write down steps to generate n conjugate direction. Prove that the directions generated are conjugate to each other with respect to the matrix A.

Q. 3 Decide whether the following is true and if so, prove it; if not, provide a counter-example: In the linear conjugate gradient method, p_k is always an ascent direction and therefore $\beta_k > 0$.

Q. 4 Show that the linear conjugate gradient method converges in atmost n steps.