

MA/OR/ST 706: Nonlinear Programming
Homework 3
Instructor: *Dr. Kartik Sivaramakrishnan*

INSTRUCTIONS

Due in class on Tuesday February 26, 2008. All problems are from the 2nd edition of Nocedal and Wright unless otherwise specified. Please read Chapters 5 and 6 in Nocedal and Wright before beginning the assignment. No late homeworks will be accepted without prior instructor approval.

1. Problem 5.1, Page 133.
2. Problem 5.2, Page 133.
3. Problem 5.9, Page 134.
4. Show that when applied to a quadratic function with exact line searches, the Polak-Ribière formula given by (5.44) reduces to the Fletcher-Reeves formula (5.41a).
5. Implement Algorithm 6.1 using Kartik's backtracking line search algorithm from the course webpage. Use it to minimize the Rosenbrock function $f(x) = 100(x_2 - x_1^2)^2 + (1 - x_1)^2$. Use the heuristic formula (6.20) to generate the starting inverse Hessian approximation. Test your algorithm with the starting points $x_0 = (1.2, 1.2)^T$ and $x_0 = (-1.2, 1)^T$. Do you observe superlinear convergence towards the end of the algorithm.
6. Problem 6.3, Page 162.
7. Problem 6.4, Page 162.