HUMBOLDT–UNIVERSITÄT ZU BERLIN
MATHEMATISCH-NATURWISSENSCHAFTLICHE FAKULTÄT II
INSTITUT FÜR MATHEMATIK
PROF. PHD. ANDREAS GRIEWANK
KSHITIJ KULSHRESHTHA

Humboldt-Universität zu Berlin, Institut für Mathematik, Unter den Linden 6, D-10099 Berlin

Introduction to Algorithmic Differentiation

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Practice Exercise 1a

To be finished by November 3, 2004

Exercise 1.4 For the mapping from the Cartesian coordinates (x_1, x_2, x_3) to the corresponding spherical polar coordinates (r, ϕ, θ) examine the absolute errors $[f(x+he_i)-f(x)]/h-\partial f/\partial x_i$ for $h = 10^{-k}$. Observe for which k the difference underflows to zero and determine the best possible approximation. Use single and double precision arithmetic for the experiments. Compare the results with those obtained in Exercise 1.3. Compare the number of operations required.

Exercise 1.5 For the same function use symbolic differentiation as in `Maple` and evaluate the derivatives. Compare the number of operations with both divided differences and the forward mode code.

Phone: (030) 2093-5414 Faxphone: (030) 2093-5848
e-mail: griewank@math.hu-berlin.de, kshitij@math.hu-berlin.de
WWW: http://www.mathematik.hu-berlin.de/~gaggle/AD/ADuebung.html