

CS726, Fall 2016
Homework 8
(due in class Wednesday 12/7/16)

Hand in hard copies of your code and results, and answers to the questions, in class on the due date. In addition, put these files in the dropbox HW8 on the `learn@UW` site: `qinterp.m`, `direct.m`.

The piazza site contains `testdfo.m`, which you should use as the calling program to test your codes. It also contains the function evaluation routine `xpowsing.m`.

1. Exercise 9.2.
2. Exercise 9.8.
3. Write a Matlab code `qinterp.m` that sets up and solves the system for computing quadratic interpolants for a monomial basis in n variables, from $(n+1)(n+2)/2$ data points. Use this code to solve Exercise 9.7.
4. Write a Matlab code to implement a randomized version of the pattern-search derivative-free method, Algorithm 9.2 in the text.
 - Your code `direct.m` will be tested by the calling program `testdfo.m`. See the testing program for inputs and outputs.
 - Terminate successfully when the steplength γ falls below `directparams.toler`. Terminate with an error if convergence is not detected in `directparams.maxits` iterations.
 - Use $\rho(\gamma) = \gamma^2$ in the step acceptance criterion.
 - Your direction set \mathcal{D} should be the same at all iterations. It consists of the $2n$ directions $\pm e_i$, $i = 1, 2, \dots, n$.
 - At each iteration, search the direction set *in random order* and use the first direction that satisfies the acceptance criterion. (The Matlab command `randperm(2*n)` is useful here.)
 - For purposes of comparison, the code `testdfo` also calls the BFGS code that you programmed in a recent homework. Just copy across your files `BFGS.m` and `StepSize.m` from this homework.