MATH 426 - Assignment 10

June 29, 2008

1 Approximation of functions by polynomials

Let the function f(x) be given by the following:

$$f(x) = \frac{1}{1+x^2}$$

Use polyfit to apporximate f(x) by a polynomials of degree k = 2, 4, and 6. Plot the approximating polynomials and also the approximation error for each case. Note that you also will need polyval to evaluate the approximating polynomial.

Submit your code and the results for the case of k = 6.

2 Optimization

Use fminsearch to solve the following unconstrained optimization problem.

$$\min_{\mathbf{x}\in\mathbb{R}^4} f(x) = (x_1 + 10x_2)^2 + 5(x_3 - x_4)^2 + (x_2 - 2x_3)^4 + 10(x_1 - x_4)^4$$

Use the following as initial guess

$$x_0 = \begin{bmatrix} 3\\ -1\\ 0\\ 1 \end{bmatrix}$$

What is the minimizer you find, and what is the value of the objective function f(x) at that point? Also, report the number of iterations taken to converge.