Lecture-3

Search Directions

Homework Due 1/16/01

- 2.1, 2.2, 2.3, 2.8, 2.13, 2.14

Rate of Convergence

Definition : Suppose $\{p_n\}_{n=0}^{\infty}$ is a sequence that converges to p and that $e_n = p_n - p$

$$\lim_{n\to\infty}\frac{|p_{n+1}-p|}{|p_n-p|^{\alpha}} = \lim_{n\to\infty}\frac{|e_{n+1}|}{|e_n|^{\alpha}} = \lambda$$

then the seq is said to converge to p of order α with asymptotic error constant λ.

$\alpha = 1$, linear

$\alpha = 2$, quadratic

$\alpha = 1$, and $\lambda = 0$, superlinear

Problem

$$\min_x f(x)$$

Definitions

A point x^* is a stationary point if $f'(x^*) = 0$

A point x^* is a global minimizer if $f(x^*) \le f(x)\ \forall x$

A point x^* is a local minimizer if there is a neighborhood N s.t. $f(x^*) \le f(x)\ \forall x \in \mathrm{N}$

A point x^* is a strict local minimzer if there is a neighborhood N s.t. $f(x^*) < f(x)\ \forall x \in \mathrm{N}, x \ne x^*$

if $\nabla f(x^*) = 0$, but x^* is neither a minimum nor a maxima, it is called a saddle point.

First Order necessary conditions

If x^* is a local minimizer and f is continuously differentiable in an open neighborhood of x^*, then $\nabla f(x^*) = 0$.