

Integer and Nonlinear Optimization

Exercise 13

Problem 1 (6 points)

Prove the following estimation formulas for the required number n of function evaluations for the respective line search methods.

- (a) Uniform Search : $n \geq \frac{b_1 - a_1}{l/2} - 1$
- (b) Dichotomous Search : $(2)^{\frac{n}{2}} \geq \frac{b_1 - a_1}{l}$
- (c) Golden Section Search : $\left(\frac{2}{\sqrt{5}-1}\right)^{n-1} \geq \frac{b_1 - a_1}{l}.$

Problem 2 (18 points)

Implement each of the following algorithms in Matlab and submit the *running* programs.

- (a) Dichotomous search method
- (b) Golden section method
- (c) Fibonacci search method
- (d) Newton's method.

Find the minimum of $e^{-\lambda} + \lambda^2$ by each of the four procedures.