Exercițiul 1

Folosind metoda căutării dihotomice găsiți minimul funcției $f(x) = x(x-1,5)$ în cadrul intervalului $[0,1]$ cu o precizie de 10%. Constanta de discernabilitate va fi luată la alegere.

$f: [0,1] \to \mathbb{R}$ $\quad [a_1, b_1] = [0,1]$

$\varepsilon = 0,1$

$\delta = 0.01$

ITER 1 $\quad |b_1 - a_1| = 1 > \varepsilon$

$$\lambda_1 = \frac{a_1 + b_1}{2} - \delta = 0,49$$

$$\mu_1 = \frac{a_1 + b_1}{2} + \delta = 0,51$$

$$f(\lambda_1) = f(0,49) = -0,4949$$

$$f(\mu_1) = f(0,51) = -0,5049$$

$$f(\lambda_1) > f(\mu_1) \Rightarrow [a_2, b_2] = [\lambda_1, b_1]$$

$$[a_2, b_2] = [0,49, 1]$$

ITER 2 $\quad |b_2 - a_2| = 0,51 > \varepsilon$

$$\lambda_2 = \frac{a_2 + b_2}{2} - \delta = 0,735$$

$$\mu_2 = \frac{a_2 + b_2}{2} + \delta = 0,755$$

$$f(\lambda_2) = f(0,735) = -0,562$$

$$f(\mu_2) = f(0,755) = -0,562$$

$f(\lambda_2) \cong f(\mu_2) \Rightarrow [a_3, b_3] = [a_2, \mu_2]$

$[a_3, b_3] = [0{,}49 , 0.755]$

ITER3 $|b_3 - a_3| = 0{,}265 > \varepsilon$

$\lambda_3 = \frac{a_3+b_3}{2} - \delta = 0{,}6125$

$\mu_3 = \frac{a_3+b_3}{2} + \delta = 0{,}6325$

$f(\lambda_3) = f(0{,}6125) = -0{,}54$

$f(\mu_3) = f(0{,}6325) = -0{,}54$

$f(\lambda_3) \cong f(\mu_3) \Rightarrow [a_4, b_4] = [a_3, \mu_3]$

$[a_4, b_4] = [0{,}49 , 0{,}6325]$

ITER4 $|b_4 - a_4| = 0{,}1425 > \varepsilon$.

$\lambda_4 = \frac{a_4+b_4}{2} - \delta = 0{,}551$

$\mu_4 = \frac{a_4+b_4}{2} + \delta = 0{,}571$

$f(\lambda_4) = f(0{,}551) = -0{,}522$

$f(\mu_4) = f(0.571) = -0{,}530$

$f(\mu_4) < f(\lambda_4) \Rightarrow [a_5, b_5] = [\lambda_4, b_4]$

$[a_5, b_5] = [0{,}551 , 0{,}6325]$

$|b_5 - a_5| = 0.0815 < \varepsilon$

$\Rightarrow$ STOP $\Rightarrow$ $x_{min} = \frac{b_5 + a_5}{2} = 0{,}6 . \Rightarrow f(x_{min}) = -0{,}53$