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Lista de Atividades 3

01- $f(x) = x^2 - x - 2,5$

A partir do gráfico podemos obter as raízes A e B com A(-1,5, -1) e B(2, 2,5)

Obtendo o zero da função

$x^2 - x - 2,5$

$x^2 = x + 2,5$

$x = \sqrt{x + 2,5}$

$L'(x) = \dfrac{1}{2,5\sqrt{x+2,5}}$

$L'(x) = \dfrac{1}{2,5\sqrt{x+2,5}} < 1$ para A e B

A= $X_0 = \dfrac{a+b}{2} = \dfrac{(-1,5+(-1))}{2} = \dfrac{-2,5}{2} = -1,25$

$X_0 = -1,25 = \sqrt{-1,25 + 2,5} = 1,11803$

$X_1 = \sqrt{1,11803 + 2,5} = \pm 1,90211$

$X_2 = \sqrt{1,90211 + 2,5} = \pm 2,09812$

$X_3 = \sqrt{2,09812 + 2,5} = \pm 2,14432$

$X_4 = \pm 2,15507$

$X_5 = \pm 2,15757$

$X_6 = \pm 2,15814$

$X_7 = \pm 2,15827$

$X_8 = \pm 2,15830$

$X_9 = \pm 2,15831$

$X_{10} = 2,15831$

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Critério de Parada

I) $\frac{|x_k - x_{k-1}|}{2} < \varepsilon$

$\frac{|2,15831 - 2,158301|}{2} < \varepsilon \Rightarrow 5.10^{-6} < \varepsilon$

0,000005

II) $|f(x)| < \varepsilon$

$f(x_0) = x^2 - x - 2,5$

$f(x) = 2,15831^2 - 2,15831 - 2,5$

$f(x) = -7,9439.10^{-6} < \varepsilon$

$f(x) = |+7,9439.10^{-6}| < \varepsilon$!

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b) $x_0 = \frac{a+b}{2} = \frac{(2+2,5)}{2} = \boxed{2,25}$

$X_0 = 2,25 = \sqrt{2,25+4,25}$

c) $X_0 = \frac{a+b}{2} = \frac{(2+2,5)}{2} = \boxed{2,25}$

$X_1 = \sqrt{2,25+2,5} = 2,17945$

$X_2 = \sqrt{2,17945+2,5} = 2,16320$

$X_3 = \sqrt{2,16320+2,5} = 2,15945$

$X_4 = \sqrt{2,15945+2,5} = 2,15857$

$X_5 = \sqrt{2,15857+2,5} = 2,15837$

$X_6 = \sqrt{2,15837+2,5} = 2,15833$

$X_7 = \sqrt{2,15833+2,5} = 2,15832$

$X_8 = \sqrt{2,15832+2,5} = 2,15831$ ✓

spiral

Critério de parada

I) $\frac{|2,15831 - 2,15830|}{2} = 4 \cdot 10^{-4} < 2\varepsilon$

II) $f(x) = x^2 - x - 2,5$

$\Delta(x) = |+7,9439\ 10^{-4}| < \varepsilon$

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Q2- $f(x) = e^x + 0,5x - 0,5$

Sendo o gráfico da $f(x)$ a raiz gerada é de $a \in [-0,5, 0]$

$$f'(x) = e^x + 0,5$$

Seja $X_0 = \frac{(a+b)}{2} = \frac{(-0,5+0)}{2} = -0,25$

$$X_1 = X_0 - \frac{f(x_0)}{f(x_0)} = -0,25 - \frac{0,159801}{1,278801}$$

$$X_1 = -0,37027$$

$$X_2 = X_1 - \frac{f(x_1)}{f'(x_1)} = -0,37027 - \frac{0,005413}{1,190548}$$

$$X_2 = -0,374817$$

$$X_3 = X_2 - \frac{f(x_2)}{f'(x_2)} = -0,374817 - \frac{0,000007}{1,187415}$$

$$X_3 = -0,374823$$

$$X_4 = X_3 - \frac{f(x_3)}{f'(x_3)} = -0,374823 - \frac{0}{1,187411}$$

$$X_4 = -0,374823$$

spiral

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Critério de Parada $\varepsilon = 0,000050$

I) $\frac{|x_k - x_{k-1}|}{2} < \varepsilon$

$\frac{(-0,374823 - (-0,374822))}{2} = -0,000000005$

$|+0,000000005| < \varepsilon$ OK

II) $|f(x)| < \varepsilon$

$f(x) = e^x + 0,5x - 0,5$

$f(x) = e^{-0,374823} + 0,5(-0,374823) - 0,5$

$f(x) = -0,000000056 < \varepsilon$

$|-0,000000056| < \varepsilon$ OK