Atividade 04 – NEWTON-RAPHSON

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|  | M106 – Cálculo Numérico  Prof. Edson J. C. Gimenez 2021/Sem1 |

Exercício proposto 1: Encontre uma raiz real aproximada para a função f(x) = x3 – 5x2 + 17x + 21, considere quatro casas decimais e erro de 0,01.

**f(x) = x3 – 5x2 + 17x + 21 f’(x) = 3x2 – 10x + 17 f’’(x) = 6x – 10**

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **x** | **-3** | **-2** | **-1** | **0** | **1** | **2** | **3** |
| **f(x)** | -102 | -41 | -2 | 21 | 34 | 43 | 54 |
| **f’(x)** | 74 | 49 | 30 | 17 | 10 | 9 | 14 |
| **f’’(x)** | -28 | -22 | -16 | -10 | -4 | 2 | 8 |

**ε < 0,01**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **n** | **xk** | **f(xk)** | **f’(xk)** | **xk-x(k-1)** |
| 0 | -1 | -2 | 30 |  |
| 1 | - 0,9333 | - 0,0343 | 28,9461 | 0,0667 |
| 2 | - 0,9321 | - 0,0004 | 28,9274 | 0,0012 |

**Para |f(xk)| < 0,01 → x = - 0,9321**

**Para |xk-x(k-1)| < 0,01 → x = - 0,9321**

Exercício proposto 2: Encontre uma raiz real aproximada para a função f(x) = e-x – x, considerando quatro casas decimais e precisão de 10-2.

**f(x) = e-x – x f(x) = -e-x – 1 f(x) = e-x**

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| **x** | **-3** | **-2** | **-1** | **0** | **1** | **2** | **3** |
| **f(x)** | 23,0855 | 9,3891 | 3,7183 | 1 | -0,6321 | -1,8647 | -2,9502 |
| **f’(x)** | -20,0855 | -7,3891 | -2,7183 | -1 | -0,3679 | -0,1353 | -0,0498 |
| **f’’(x)** | 20,0855 | 7,3891 | 2,7183 | 1 | 0,3679 | 0,1353 | 0,0498 |

**ε < 10-2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **n** | **xk** | **f(xk)** | **f’(xk)** | **xk-x(k-1)** |
| 0 | 0 | 1 | -2 |  |
| 1 | 0,5 | 0,1065 | - 1,6065 | 0,5 |
| 2 | 0,5663 | 0,0013 | - 1,5676 | 0,0663 |
| 3 | 0,5671 |  |  | 0,0008 |

**Para |f(xk)| < 10-2 → x = 0,5663**

**Para |xk-x(k-1)| < 10-2 → x = 0,5671**