1. Estimate the roots of the following equations using Bisection and Newton’s method (epsilon = 10-8).

|  |  |  |
| --- | --- | --- |
| f(x) *= sin x* | Bisection Method on [3.0, 4.0] | Newton’s Method with *x0* = 4.0 |
| # iterations | **26** | **4** |
| final estimate | **3.141592659** | **3.141592654** |
| final error | **0.000000007** | **0.000000000** |

|  |  |  |
| --- | --- | --- |
| f(x) *= x7 -3* | Bisection Method on [1.0, 1.5] | Newton’s Method with *x0* = 1.5 |
| # iterations | **25** | **6** |
| final estimate | **1.169930808** | **1.169930813** |
| final error | **0.000000007** | **0.000000000** |

2. Estimate the solution to x3 + 2x2 -3x -1 = 0 using Bisection and Newton’s method with epsilon = 10-8.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Bisection | # iterations | Final estimate |  | Newton’s | # iterations | Final estimate |
| [-3.0, -2.0] | **26** | **-2.912229173** |  | *x0* = -3.0 | **3** | **-2.912229179** |
| [-2.0, 0] | **27** | **-0.286462061** |  | *x0* = -2.0 | **8** | **-2.912229178** |
| [0, 1.0] | **26** | **0.999999993** |  | *x0* = -1.5 | **12** | **1.198691244** |
| [1.0, 3.0] | **27** | **1.198691241** |  | *x0* = 0 | **4** | **-0.286462065** |
| [-3.0, 1.5] | **28** | **-2.912229178** |  | *x0* = 0.5 | **8** | **-2.912229178** |
| [-3.0, 3.0] | **29** | **1.198691240** |  | *x0* = 1.5 | **4** | **1.198691244** |

3. For each case below, report the estimated solution and number of iterations required to solve:

****

1. Use the Bisection method on the interval [-2.0, 2.0]

**iterations: 28**

**bisection answer: -0.000000007**

1. Use Newton’s method starting with x0 = 1.0

**total iterations: 5**

**newtons answer: -0.000000000**

1. Use Newton’s method starting with x0 = 1.1

**OverflowError: math range error**

4. Review the attached application (“Saving for a Down Payment”). Which of the following scenarios requires a smaller compounded monthly interest rate to achieve a goal of $25,000 after three years?

1. a $14,000 initial investment with $250 per month thereafter; or

**iterations: 14**

**bisection answer: 0.034628601**

1. a $12,500 initial investment with $300 per month thereafter.

**iterations: 14**

**bisection answer: 0.030662537**

Justify your answer:

**Scenario (b)**