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Numerical Computing Lab Session 1:

**Task 1(If more than one root kindly mention all values)**

|  |  |
| --- | --- |
| Function | Root (by visualization) |
|  | 0.75 |
|  | 0.3, 1.30 |
|  | -2.3, -0.63 |

**Task 2 (Bisection Method)**

|  |  |  |  |
| --- | --- | --- | --- |
| Tol | No. of Iterations | Interval | Root |
| 0.001 | 13 | -3,4 | 0.623901 |
| 0.00001 | 20 | -3,4 | 0.624188 |

Repeat the process by selecting another interval

|  |  |  |  |
| --- | --- | --- | --- |
| Tol | No. of Iterations | Interval | Root |
| 0.001 | 10 | 0,1 | 0.624023 |
| 0.00001 | 17 | 0,1 | 0.624184 |

|  |  |  |  |
| --- | --- | --- | --- |
| Tol | No. of Iterations | Interval | Root |
| 0.001 | 9 | 1,1.5 | 1.25684 |
| 0.00001 | 16 | 1,1.5 | 1.25663 |

Repeat the process by selecting another interval

|  |  |  |  |
| --- | --- | --- | --- |
| Tol | No. of Iterations | Interval | Root |
| 0.001 | 10 | 1,2 | 1.25684 |
| 0.00001 | 17 | 1,2 | 1.25663 |

|  |  |  |  |
| --- | --- | --- | --- |
| Tol | No. of Iterations | Interval | Root |
| 0.001 | 12 | -1,2 | -0.798584 |
| 0.00001 | 19 | -1,2 | -0.798155 |

Repeat the process by selecting another interval

|  |  |  |  |
| --- | --- | --- | --- |
| Tol | No. of Iterations | Interval | Root |
| 0.001 | 9 | -0.5,-1 | -0.797852 |
| 0.00001 | 16 | -0.5,-1 | -0.798164 |

Write your Observations:

The number of iterations are getting increased and the result is also same to some points

3 dec places are achieved.

**Task 3 (Newton Raphson Method)**

|  |  |  |  |
| --- | --- | --- | --- |
| Tol | No. of Iterations | Starting Point | Root |
| 0.001 | 3 | 1.5 | 0.624185 |
| 0.00001 | 4 | 1.5 | 0.624185 |

Repeat the process by selecting another interval

|  |  |  |  |
| --- | --- | --- | --- |
| Tol | No. of Iterations | Starting Point | Root |
| 0.001 | 3 | 1 | 0.624185 |
| 0.00001 | 4 | 1 | 0.624185 |

|  |  |  |  |
| --- | --- | --- | --- |
| Tol | No. of Iterations | Starting Point | Root |
| 0.001 | 4 | 1.5 | 1.25662 |
| 0.00001 | 4 | 1.5 | 1.25662 |

Repeat the process by selecting another interval

|  |  |  |  |
| --- | --- | --- | --- |
| Tol | No. of Iterations | Starting Point | Root |
| 0.001 | 10 | -1.5 | -0.79816 |
| 0.00001 | 10 | -1.5 | -0.79816 |

|  |  |  |  |
| --- | --- | --- | --- |
| Tol | No. of Iterations | Starting Point | Root |
| 0.001 |  |  |  |
| 0.00001 |  |  |  |

Repeat the process by selecting another interval

|  |  |  |  |
| --- | --- | --- | --- |
| Tol | No. of Iterations | Starting Point | Root |
| 0.001 |  |  |  |
| 0.00001 |  |  |  |

Write your Observations:

Newton Raphson is way better method by bisection as we reached the root in less no of iterations. The roots are also the same when we changed the intervals.

**Task 4:**

|  |  |
| --- | --- |
| Function | Root (by fsolve) |
|  |  |
|  |  |
|  |  |