Problem 1 (1):

Use the Bisection method to find for on .

To begin, set . Calculating the value of at each of these gives:

Because has the same sign as , set and . This gives . Calculating the value of at each of these gives:

Because has the same sign as , set and . This gives .

Problem 2 (14):

Find an approximation to correct to within using the Bisection Algorithm.

Consider the function . Note that the positive root to this function is the value of . Thus, using the Bisection method to find the roots of allows the approximation of . If the error between the approximation and the actual value is to be less than , then Theorem 2.1 can be used to find the bound on the number of iterations necessary to achieve such accuracy. Use the interval , which gives and .

Thus, the first value produced by the Bisection method which is guaranteed to satisfy the accuracy requirement is . Performing the Bisection method for this problem reveals that the accuracy specification is met by .

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
| 1 | 1 | 2 | 1.5 | -0.75 |
| 2 | 1.5 | 2 | 1.75 | 0.0625 |
| 3 | 1.5 | 1.75 | 1.625 | -0.3594 |
| 4 | 1.625 | 1.75 | 1.6875 | -0.1523 |
| 5 | 1.6875 | 1.75 | 1.7188 | -0.0459 |
| 6 | 1.7188 | 1.75 | 1.7344 | 0.008057 |
| 7 | 1.7188 | 1.7344 | 1.7266 | -0.01898 |
| 8 | 1.7266 | 1.7344 | 1.7305 | -0.005478 |
| 9 | 1.7305 | 1.7344 | 1.7324 | 0.001286 |
| 10 | 1.7305 | 1.7324 | 1.7314 | -0.002097 |
| 11 | 1.7314 | 1.7324 | 1.7319 | -0.000406 |
| 12 | 1.7319 | 1.7324 | 1.7322 | 0.0004397 |
| 13 | 1.7319 | 1.7322 | 1.7321 | 0.00001682 |

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