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MATH 446

**Project 1: Results**

1.)  
**Equation:** f(x) = 8 cos^3(8x) + 12 sin^2(8x) + 96(cos^4(x) + sin^2(x) − 7/8) cos(4x) − 17

|  |  |  |
| --- | --- | --- |
| **Interval** | **Result** | **Rounded r \*** |
| [0 , 0.5] | 0.212640686688246 | 0.2126406867 |
| [0 , 0.47] | 0.212640686708619 | 0.2126406867 |
| [0 , 0.43] | 0.212640686693485 | 0.2126406867 |

\*The results agree up to 10 places.

2.)  
**Backward Error:** 1.802337834533319e-09  
  
**Conclusion:**  
I am confident that these are the correct 10 digits of the root. The backward error seems to indicate a reasonable accuracy. If the backwards error indicates accuracy of 9 places this would make sense because the 10th place is the one fluctuating as seen in the table.

3.)  
**Equation:** f(x) = 8 cos^3(8x) + 12 sin^2(8x) + 96(cos^4(x) + sin^2(x) − 7/8) cos(4x) − 19

|  |  |  |
| --- | --- | --- |
| **Interval** | **Result** | **Rounded r \*** |
| [0 , 0.5] | 0.130898594856262 | 0.1308985949 |
| [0 , 0.47] | 0.130900192260742 | 0.1309001923 |
| [0 , 0.43] | 0.130901315212250 | 0.1309013152 |

\*The results do not agree up to 10 places  
  
4.)  
**Backward Error:** 1.421085471520200e-14  
  
**Conclusion:**  
I am not confident that these are the correct 10 digits of the root. There is too much variation between the sampled intervals starting at the fourth place. The backwards error seems to be indicating that these are the correct 10 digits but this doesn't make sense when viewing the results of the bisection method.  
  
**Final Notes (differences):**  
The results of the first equation are accurate with a reasonable backwards error. The results of the second equation were not accurate with the backwards error indicating greater accuracy. This is not what I would have expected.