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CS323 Assignment 2

Problem 2 (written Portion)

1) $f(x) = \cos(x) + \cos(x^2) + \cos(x) - 1 = 0$
Where $x \in [0, 2]$
Tolerance 10^{-6}

- $f(0) = \cos(0) + \cos(0^2) + \cos(0) - 1$
  $\boxed{f(0) = 2}$
- $f(2) = \cos(2) + \cos(2^2) + \cos(2) - 1$
  $\boxed{f(2) = -2.4859}$

→ $f(1) = \cos(1) + \cos(1^2) + \cos(1) - 1$
$\boxed{f(1) = 0.6209}$

$f(1) = 0.6209 > 0$ & $f(2) = -2.4859 < 0$
*We know that the root lies between 1 and 2

1st iteration: $x_0 = \frac{1+2}{2} = 1.5$

2nd iteration: $f(1) = 0.6209 > 0$ & $f(1.5) = -1.4867 < 0$
*root lies between 1 & 1.5

$f(x_1) = f(1.25) = 2\cos(1.25) + \cos(1.5625) - 1 = -0.3611 < 0$

3rd iteration: $f(1) = 0.6209 > 0$ & $f(1.25) = -0.3611 < 0$

$x_2 = \frac{1 + 1.25}{2} = 1.125$

$f(x_2) = f(1.125) = 2\cos(1.125) + \cos(1.2656) - 1 = 0.1628 > 0$

4th iteration:

⋮

nth iteration