DEPARTMENT OF MATHEMATICS

BIRLA INSTITUTE OF TECHNOLOGY MESRA, RANCHI

IMM5002 Numerical Method Lab, Session: (MO-19)

Lab Assignment - 3

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1. The following four methods are proposed to compute $\sqrt[3]{21}$. Rank them in order based on their apparent speed of convergence, assuming $p_0 = 1$:

   (a) $p_n = \dfrac{20P_{n-1} + \frac{21}{p_{n-1}^2}}{21}$,

   (b) $p_n = p_{n-1} - \dfrac{p_{n-1}^3 - 21}{3p_{n-1}^2}$,

   (c) $p_n = p_{n-1} - \dfrac{p_{n-1}^4 - 21p_{n-1}}{p_{n-1}^2 - 21}$,

   (d) $p_n = \left(\dfrac{21}{p_{n-1}}\right)^{\frac{1}{2}}$,

   Based upon the first four iterations, which one do you think gives the best approximation to the solution.

2. Find all the zeros accurate to within 10^{-4} of $f(x) = x^2 + 10\cos x$ by using the fixed point iteration method for an appropriate iteration function g.

3. For $x = 2 + \dfrac{5}{x^2}$, determine the interval $[a, b]$ on which the fixed point iteration will converge. Estimate the number of iterations necessary to obtain approximations accurate to within 10^{-5} and perform the calculations.