National University of Computer & Emerging Sciences, Karachi
Department of Computer Science
Exercises

Course Name: Numerical Computing	Course Code: CS2008
Semester: Spring Section: BCS 6J	Instructor Name: Shahid Ashraf

- Use bisection method to find the real root of $f(x) = \sqrt{x} - \cos x$ over $[0,1]$ with absolute approximate $error < 0.01$ \hfill Ans: x= 0.64844

- Use method of false position to find the $f(x) = \sqrt{x} - \cos x$ over $[0,1]$ with absolute approximate $error < 0.01$ \hfill Ans: x= 0.64356

- Solve $x = 2e^{-x}$ by bisection and Regula-Falsi method over $[0,1]$ with percentage relative approximate true error$< 1\%$ and comments on the result. \quad Ans: x= (bisection) Ans:x= 0.85396 (regula-falsi method)

- A data base file memory is related to time i.e,

$$N(t) = t^3 - 7t^2 + 14t + 10$$

  Where N(t) represent number of bytes and t represents time. Find the time at which file memory reach 16 bytes by using False Position method? Where $a = 0, b = 1$ and absolute true error< 0.001 \hfill Ans: t= 0.58653

- Resistance of moving vehicle ,$f(x) = x^4 - x - 10$ where x is the displacement. Find the displacement at zero resistance by using fixed point iteration method with absolute approximate error < 0.0001 and $x_0 = 4$ \hfill Ans: x= 1.85558

- A shell is fired vertically upward and its vertical height x in meters is given by,

$$x = \cos t - 3t + 3$$

  Where t represent time in seconds. Determine the time required for the vertical height will reach 2m by using fixed point iteration method with initial guess=0 and absolute approximate error< 0.00001 \hfill Ans: t= 0.60710

- The number of clients in the ABC server is related to time i.e,

$$N(t) = 74e^{-1.5t} + 20e^{-0.075t}$$

  Determine the time required for the server will have 15 clients by using Newton-Raphson Method with an initial guess of $t = 6$ and stopping criteria of Absolute approximate percentage $error < 0.5\%$ \hfill Ans: t= 4.00163

- A particle is moving with the velocity$v(t) = t\cos t + \sin t$ at time t. Find the time at which particle will be at rest by using secant method with an initial guesses $t_0 = 2$and $t_1 = 3$ and stopping criteria of absolute approximate $error < 0.00001$ \quad Ans: x= 0.02876

- Find the root of $f(x) = x^{1/2} + x^{-1/2}$ by using Newton-Raphson method with absolute approximate error< 0.0001 and $x_0 = 2$ \hfill Ans: x= 6.85410

- The displacement s cm of the end of a stiff spring at time t seconds is given by

$$s = a + kf + \sin t - 3.5$$

Determine the time at which displacement of the spring is 4.5 cm, if $a = 2, k = 0.9 \ and \ f = 5$. Use Fixed point iteration method with absolute approximate $error < 0.01$ where $t_0 = 2$

Ans: t= 0.786767

- The pressure p of the atmosphere at height h above ground level is given by

$$p = c(h - p_0)^2 + \ln(h) - 2$$

, where p_0 is the pressure at ground level and c=1 constant. Determine the height at pressure $p = 2$ by using Newton-Raphson Method with absolute approximate $error < 0.0001$ (take $h_0 = 1.5$)

Ans: h= 1.41239

Interpolation:

Book Numerical Analysis by Burden and

Faires

Topic 3.1 page no (124-129)

Questions 1,2,5,6,13,14,19