

Bago University
Department of Mathematics
First Semester Examination, March 2019

Fourth Year (B.Sc)
(Mathematics Specialization)

Math 4102
Numerical Analysis I
Time Allowed: (3) hours

Answer All Questions.

1.(a) Convert $(23.59375)_{10}$ to base 2.

(b) Find an approximate value of the equation $x - 0.5 \cos x = 0$ starting $x_0 = 1$ by using fixed point iteration method in 6S.

2.(a) Apply the Newton's Method to solve the equation $f(x) = x^3 - 5x + 3$. Starting from $x_0 = 2$ and work in six significant figures.

(b) Find the solution of $f(x) = x - 2 \sin x$ by the secant method. Starting from $x_0 = 2, x_1 = 1.9$, and work in six decimal places.

3.(a) Solve $x^4 = 2$ with $a = 1, b = 2$, by the method of false position. Work in six decimal places.

(b) Compute a 4D-value of $\ln 9.2$ from $\ln 9.0 = 2.1972, \ln 9.5 = 2.2513$ by Lagrange interpolation. Estimate the error, first by directly method and then by the error principle.

4.(a) Make a forward difference table for the data to find $\cosh 0.56$ using 6S.

x_j	0.5	0.6	0.7	0.8
f_j	1.127626	1.185465	1.255169	1.337435

(b) Evaluate $J = \int_0^1 e^{-x^2} dx$ by Simpson's rule with $2m = 10$, using 6S.

5.(a) Apply the Gauss-Seidel iteration to solve the system

$$5x_1 + x_2 + 2x_3 = 19$$

$$x_1 + 4x_2 - 2x_3 = -2$$

$$2x_1 + 3x_2 + 8x_3 = 39$$

Do 3-steps, starting from 1, 1, 1 and using 3D in the computation.

P.T.O

(b)Solve the system

$$4x_1 + 2x_2 + 14x_3 = 14$$

$$2x_1 + 17x_2 - 5x_3 = -101$$

$$14x_1 - 5x_2 + 83x_3 = 155 \text{ by Cholesky's method.}$$

6.(a) Compute l_1, l_2 and l_∞ -norms of the vector $[1 \ -3 \ 8 \ 0 \ -6 \ 0]^T$.

(b) Compute the matrix norm and the condition number of the matrix $\begin{bmatrix} 2.1 & 4.5 \\ 0.5 & 1.8 \end{bmatrix}$ corresponding to the l_1 -vector norm.
