Eastern Mediterranean University
Faculty of Arts and Sciences
Department of Mathematics
MATH 373-Numerical Analysis for Engineers
FINAL EXAMINATION, 2020-2021 SUMMER

Question1. (25 pts.)

a) Find the curve fit $y = \dfrac{30}{1+Dx^A}$, using the data linearization for the given points.

x_k	y_k
2	1
3	2
4	3
5	5
6	6

b) Determine RMS Error $E_2(f)$.

Question2. (25 pts.)

a) Determine the number M and the interval width h so that the Composite Simpson Rule for 2M subintervals can be used to compute the given integral with an accuracy of 9×10^{-5}.

$$\int_2^4 \frac{1}{1-2x}\,dx$$

b) Evaluate $\int_2^4 \dfrac{1}{1-2x}\,dx$ using Composite Simpson Rule with an error bound by 9×10^{-5}.

Question3. (25 pts.)

Derive the numerical differentiation formula using Taylor series expansion

$$f''(x) \approx \frac{2f_0 - 5f_{-1} + 4f_{-2} - f_{-3}}{h^2}$$

by obtaining the error and give the optimum step size h that minimizes error.

Question4. (25 pts.)

Solve the initial value problem

$$y' = 3y + 3t$$

Using Heun's Method over [0,2] with h=0.2 and y(0)=1 to obtain approximation for the solution of the I.V.P. at y(0.4). Compare the exact solution y(0.4). **Exact solution:** $y(t) = \dfrac{4}{3}e^{3t} - t - \dfrac{1}{3}$.