The Open University of Sri Lanka
B.Sc. Degree Programme
Applied Mathematics - Level 05
No Book Test-2016/2017
APU3240/APE5240 — Numerical Methods

Duration: One And Half (1 ½) Hours

Date: 21.05. 2017   Time: 10.30 a.m. –12.00 noon.

ANSWER ALL QUESTIONS.

1. (a) Evaluate the integral $\int_0^2 \dfrac{e^{-x^2}}{1+x}dx$, by Trapezoidal rule using the data given below:

x	0	0.25	0.50	0.75	1.0	1.25	1.50	1.75	2.0
$f(x)$	1	0.7515	0.5192	0.3256	0.1839	0.0932	0.0422	0.01701	0.0061

where $f(x) = e^{-x^2}/1+x$.

(b) Evaluate the integral $\int_0^3 \dfrac{x^2}{1+x^3}dx$, by Simpson's Three Eight rule using the data given below:

x	0	0.25	0.50	0.75	1.0	1.25	1.50	1.75	2.0
$f(x)$	0	0.0615	0.2222	0.3956	0.5	0.5291	0.5143	0.4816	0.4444

x	2.25	2.5	2.75	3.0
$f(x)$	0.4086	0.3759	0.3470	0.3214

where $f(x) = x^2/1+x^3$. Hence find an approximate value for $\ln(28)^{1/3}$.

2. (a) Using Taylor series method, compute $y(0.2)$ correct to four decimal places given that

   $\dfrac{dy}{dx} = 1 - 2xy$ with the initial conditions $y(0) = 0$.

(b) Using Taylor series method, compute $y(0.1)$ and $y(0.2)$, given that $y'' = y + xy'$ with the initial conditions $y(0) = 1$ and $y'(0) = 0$.

3. (a) Applying Picard's method, find the first-three successive approximations to solve $\dfrac{dy}{dx} = 2x - y^2$ with the initial condition $y(0) = 0$.

(b) Using Modified Euler's method, find $y(1.2)$ and $y(1.4)$ given that $\dfrac{dy}{dx} = \dfrac{2y}{x} + x^3$ with the initial condition $y(1) = 0.5$.