A” Differential and Integral Calculus 1
MS-A0111
Hakula
Ardiyansyah/Orlich
Problem Sheet 5, 2020 P

NOTE[1]

The due date is published on the course pages. Homework can be submitted only digitally. Instructions on labeling the “papers” can be found on the course pages.

1 Introductory Problems

INTRO 1 Use Euler's method with step sizes (a) $h = 0.2$, (b) $h = 0.1$, and (c) $h = 0.05$ to approximate $y(2)$ given that $y' = x + y$ and $y(1) = 0$. (Write a programme, do not try to compute manually.)

INTRO 2 Find the general solution.

$$y'' + y' + y = 0.$$

INTRO 3 Find the complete solution.

$$\begin{cases} y'' + 100y = 0, \\ y(0) = 0, \\ y'(0) = 3. \end{cases}$$

INTRO 4 Find the complete solution.

$$\begin{cases} y'' + 2y' + 5y = 0, \\ y(3) = 2, \\ y'(3) = 0. \end{cases}$$

[1] Published on 13/10/2020.

2 Homework Problems

EXERCISE 1 Use Euler's method with step sizes (a) $h = 0.2$ and (b) $h = 0.1$ to approximate $y(2)$ given that $y' = xe^{-y}$ and $y(0) = 0$.

EXERCISE 2 Find the complete solution.

$$\begin{cases} y'' + 4y = 0, \\ y(0) = 2, \\ y'(0) = -5. \end{cases}$$

EXERCISE 3 Find the complete solution.

$$\begin{cases} y'' + 4y' + 3y = 0, \\ y(3) = 1, \\ y'(3) = 0. \end{cases}$$

EXERCISE 4 By using the change of dependent variable

$$u(x) = c - k^2 y(x),$$

solve the initial-value problem

$$\begin{cases} y''(x) = c - k^2 y(x), \\ y(0) = a, \\ y'(0) = b. \end{cases}$$