UWU/CST/21/106

Uva Wellassa University

CST 112-2: Calculus
Mid Semester Examination
SEMESTER II – 2022/2023
Department of Computer Science and Informatics
Faculty of Applied Sciences
Uva Wellassa University

(Time duration: One hour)

01. Find the following limits.

i. $\lim_{x\to 2}\left(\frac{x^3-x^2-x-2}{x-2}\right)$

ii. $\lim_{x\to\infty}\left(\frac{3x^2+7x-1}{x^2+5}\right)$

iii. $\lim_{x\to 0}\left(\frac{\sqrt{x+4}-2}{x(x+1)}\right)$

iv. $\lim_{x\to 0}\frac{1-\cos 2x}{x^2}$

v. $\lim_{x\to\infty}\frac{2-\cos x}{x+3}$

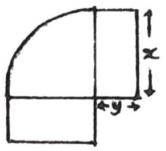
02. Find $\frac{dy}{dx}$. (Give your answer in the simplest form)

i. $y = (3x^2 - 1)(x^2 + 5x + 2)$

ii. $y = \frac{x^2+6}{2x-7}$

iii. $2x^2 + 3xy + 5y^2 = 0$

03. The figure shows a flowerbed. Its shape is a quarter of a circle of radius x meters with two equal rectangles attached to it along its radii. Each rectangle has length equal to x meters and width equal to y meters.



Given that the area of the flowerbed is $4\ m^2$.

i. Show that
$$y = \frac{16 - \pi x^2}{8x}$$

ii. Hence show that the perimeter P meters of the flowerbed is given by the equation
$$P = \frac{8}{x} + 2x$$

iii. Use calculus to find the minimum value of P.

iv. Find the width of each rectangle when the perimeter is a minimum.