

Victoria University
of
Bangladesh

program: BSc in CSE

Course code: MAT-325

Course title: Differential Equations
and Fourier Analysis

Submitted By
Md. Sakawat Hossain

ID: 2119170031

Ans To The Q.No.1

$$\textcircled{1} \quad y = e^{3x+2}$$

$$y_1 = \frac{dy}{dx} = e^{3x+2} \frac{d}{dx} (3x+2)$$

$$= e^{3x+2} (3 \cdot 1 + 0)$$

$$= 3e^{3x+2}$$

$$y_2 = \frac{y_1}{dx} = 3 \left[\frac{d}{dx} (e^{3x+2}) \right]$$

$$= 3(3e^{3x+2})$$

$$= 9e^{3x+2}$$

$$= 9y \quad \underline{\underline{\text{(Ans)}}$$

$$(ii) y = \log x + ax$$

$$\frac{dy}{dx} = \frac{1}{x} + a$$

$$\therefore y_1 = \frac{1}{x} + a$$

$$\frac{y_2 y}{dx^2} = \frac{d}{dx} \left(\frac{1}{x} + a \right)$$

$$= \frac{-1}{x^2}$$

$$y_2 = \frac{-1}{x^2}$$

Ans

Ans to The Q. NO. 2

$$f(x) = 3x^2 - 2x + 4$$

$$f'(x) = \frac{d}{dx}(3x^2) - \frac{d}{dx}(2x) + \frac{d}{dx} \cdot 4$$
$$= 3x^2 - 2$$

at

$$x=0 \text{ slope}$$

$$m = f'(0) = 3 \cdot 0^2 - 2$$

$$= -2$$

$$f(0) = 3 \cdot 0^2 - 2 \cdot 0 + 4$$

So the point is $(0, 4)$

So the equation is

$$y - y_0 = m(x - x_0)$$

$$y - 4 = -2(x - 0)$$

$$\Rightarrow y = -2x - 4$$

$$m = -2$$

$$x = 0$$

$$y = 4$$

Ans to The Q. NO. 4

$$y = x^2 - 2x + 3$$

$$\Rightarrow \frac{dy}{dx} = 2x - 2$$

$$\text{NOW; } 2x - 2 = 0$$

$$x = 1$$

put $x = 1$ at y

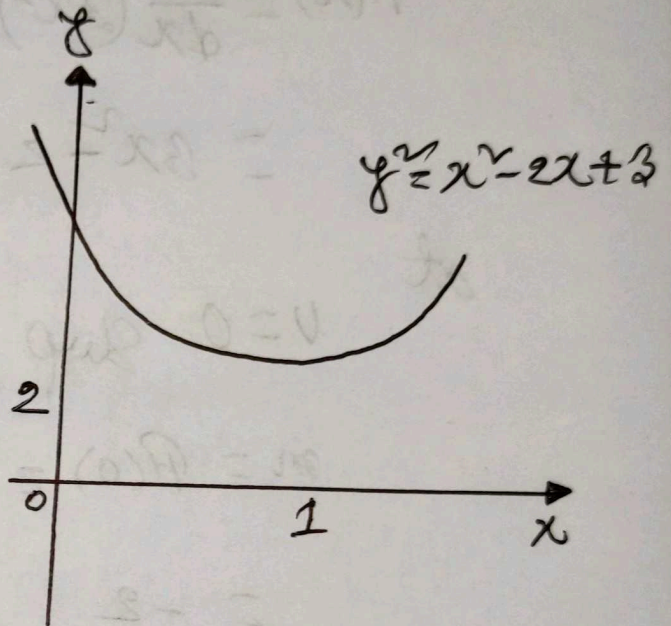
$$y = 1^2 - 2 \cdot 1 + 3$$

$$= 1 - 2 + 3$$

$$= 2$$

$$\therefore (x, y) = (1, 2)$$

Ans



Ans to the Q. NO. 5

$$W = \cos(x^2 + 2y) - e^{4x} - z^4 y + y^3$$

$$\frac{dW}{dx} = \frac{d}{dx} \left\{ \cos(x^2 + 2y) - e^{4x} - z^4 y + y^3 \right\}$$

$$= \sin(x^2 + 2y) \cdot (2x) - (e^{4x} - z^4 y) \cdot 4$$

$$= -2x \sin(x^2 + 2y) - 4e^{4x} + z^4 y.$$

$$\frac{dW}{dy} = \frac{d}{dy} \left\{ \cos(x^2 + 2y) - e^{4x} - z^4 y + y^3 \right\}$$

$$= -\sin(x^2 + 2y) \cdot 2 + 3y^2$$

$$= -2\sin(x^2 + 2y) + 3y^2$$

$$\frac{dW}{dz} = 4z^3 y e^{(4x - z^4 y)}$$