Victoria University of Bangladesh

Course Title	:	*Differential Calculus and Coordinate Geometry*
Course Code	:	*MAT 115*
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Answer to the question number: 01

① $y = e^{3x+2}$

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

$= e^{3x+2}(3.1+0)$

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

$y_2 = \frac{y2y}{dx^2} = 3\left[\frac{d}{dx}\left(e^{3x+2}\right)\right]$

$= 3\left[3e^{3x+2}\right]$

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

$= 9y$

Ans: $9y$.

② $y = \log x + ax$

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

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

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

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

$\therefore y_2 = -\frac{1}{x^2}$ (Ans)

Answer to the question number : 02

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

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

$$= 3x^2 - 2$$

Here, $x = 0$

$$m = f'(0) = 3.0^2 - 2$$

$$= -2$$

$$f(0) = 3.0^2 + 2.0 + 4$$

So the point is $(0, 4)$

Therefore the equation is

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

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

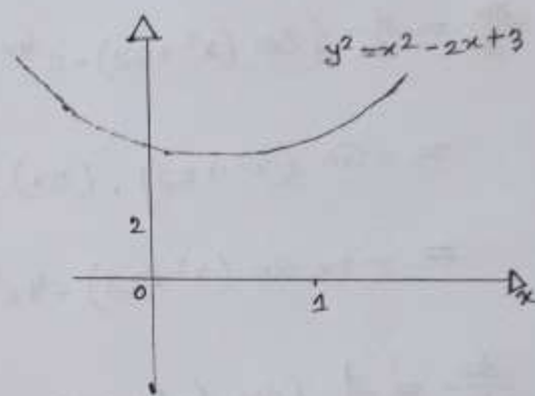
$$\therefore y = -2x - 4$$

$$\begin{bmatrix} m = -2 \\ x = 0 \\ y = 4 \end{bmatrix}$$

Answer to the question number : 04

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

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



Now, $2x - 2 = 0$

$$\Rightarrow 2x = 2$$

$$x = 1$$

Put $x = 1$ at y

$$y = 1^2 - 2.1 + 3$$

$$= 1 - 2 + 3$$

$$= 2$$

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

Answer to the question number : 5

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

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

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

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

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

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

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

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

Ans: