VICTORIA UNIVERSITY BANGLADESH

Assignment On

Course Name : Differential Calculus & Coordinate Geometry

Course code : MAT-115

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Ans to the Q.No-1 (i)

(i)

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

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

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

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

$$y'' = \frac{d}{dx}\left\{3e^{3x+2}\right\}$$

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

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

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

$$y' = \frac{1}{x} + a$$

$$y'' = \frac{-1}{x^2} + 0$$

Ans. to. the Q.No-2

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

$f'(x) = 6x - 2$

at $x=0$, $f(x) =$ and $f'(x) = -2$

tangent line, $y - y_1 = m(x - x_1)$

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

$\Rightarrow 2x + y = 4$

at $x = 3$; $f(x) = 25$, $f(x) = 16$

tangent line, $y - y_1 = m(x - x_1)$

$\Rightarrow y - 25 = 16(x - 3)$

$\Rightarrow y - 25 = 16x - 48$

$\Rightarrow 16x - y = 23$

Ans. to. the Q.NO-4

(a) $y = x^2 - 2x + 3$

$y' = 2x - 2$

for stationary point

$y' = 0$

$\Rightarrow 2x - 2 = 0$

$\Rightarrow x 1$

Ans. to the Q. No-3

(3) Relative minimum.

Consider the function $y=x^2-2x+3$. By differentiating and setting the derivative to zero- $\frac{dy}{dx}=2x-2=0$ when $x=1$, we know there is a stationary point at $x=1$.

Again, we use the first that this is the only stationary point to divide the real line into two intervals; $x<1$ and $x>1$.

From the derivative we ~~kh~~ know that since

$$\frac{dy}{dx}=2x-2=2(x-1)<0 \quad \text{when } x<1$$

the function is decreasing for $x<1$. (Choose a point wich is <1, saw $x=0$, as a test point.)

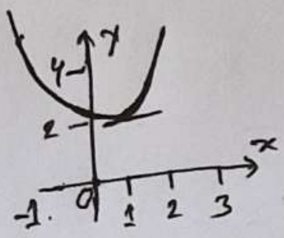
Similarly since

$$\frac{dy}{dx}=2(x-1)>0 \quad \text{when } x>1$$

the function is increasing for $x>1$. (We could use the point $x=2$ as a test point here.)

Of course, at the point $x=1$ itself $\frac{dy}{dx}=0$.

Therefore, we deduce that the stationary point at $x=1$ is a relative minimum.



The graph of $y=x^2-2x+3$.

since $\frac{dy}{dx}<0$ for $x<1$

$\frac{dy}{dx}=0$ for $x=1$.

and $\frac{dy}{dx}>0$ for $x>1$.

we have a relative minimum at $x=1$.

Again we can summarise this in a table

x	<1	1	>1
y'	-ve	0	+ve
y	↘	1	↗

Ans. to the. Q. No. 5

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

$$\frac{\partial w}{\partial x} = -\sin(x^2+2y).2x - e^{4x-z^4y}.4+0$$

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

$$\frac{\partial w}{\partial y} = -\sin(x^2+2y)\cdot 2 - e^{4x-z^4y}.z^4+3y^2$$

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

$$\frac{\partial w}{\partial z} = 0 - e^{4x-z^4y}\cdot(-4z^3y)+0$$

$$= 4z^3ye^{4x-z^4y}.$$