Name # Syed Daniyal Shah

ID # 15863

Paper # math's

Exam # Summer

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Q NO :-> 1

Ans :-> (part (A))

$$y = x^2 + x + 8$$

taking derivatives w.r.t

$$\frac{dy}{dx} = \frac{d}{dx}\left(x^2 + x + 8\right)$$

$$= 2x + 1$$

$$\boxed{\frac{dy}{dx} = 2x + 1}$$

(b) Find the first derivative, appling the product rule of $y = (3 - x^2)(x^3 - x + 1)$

Ans :-> $y = (3 - x^2)(x^3 - x + 1)$

taking derivative

(b)

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Ans:→ $y = (3-x^2)(x^3-x+1)$

taking derivative

$$\frac{dy}{dx} = \frac{d}{dx}(3-x^2)(x^3-x+1)$$

by product rule:

$$= (3-x^2)\frac{d}{dx}(x^3-x+1) + (x^3-x+1)\frac{d}{dx}(3-x^2)$$

$$= (3-x^2)(3x^2-1) + (x^3-x+1)(-2x)$$

$$= (9x^2 - 3 - 3x^4 - x^2) + (-2x^4 + 2x^2 - 2x)$$

$$= -5x^4 + 10x^2 - 2x - 3$$

Ans

Q No :-2 write the equation of straight line passing through (-1, 1)

Slop, -1

Ans Slope = M = -1

= (x, y) = (-1, 1)

= y- intercept = C = 1

=> A.s $y = Mx + C$

$y = (-1)x + 1$

$y = -x + 1$ Ans

Part (B) A particale, Start at A (-2, 3) and its co ordinates change by increment $\Delta x = 5$ $\Delta y = -6$, Find its new position

Ans :-> $\Delta x = 5$

$\Delta x = 6$

A (-2, 3)

→ Find its new position?

Sol :-

As $\Delta x = x_2 - x_1$

$\Delta x = y_2 - y_1$

So $x_1 = -2$

$y_1 = 3$

$\Rightarrow \Delta x = x_2 - x_1$

$\Rightarrow 5 = x_2 - (-2)$

$\Rightarrow 5 = x_2 + 2$

$\Rightarrow 5 - 2 = x_2$

$\Rightarrow x^2 = 3$

and

$\Rightarrow \Delta y = y_2 - y_1$

$\Rightarrow 6 = y_2 - 3$

$\Rightarrow y_2 = 6 + 3 = 9$

So the new position is A (3, 9) Ans

Q NO :-> 3

Find the equation of Tangent and normal to the Dcurve $x^2 - xy + y^2 = 7$ at the point $(-1, 2)$

Ans :-> Solution :—

$$x^2 - xy + xy^2 = 7$$

First Different it

$$\Rightarrow \frac{d}{dx} x^2 - \frac{d}{dx} xy + \frac{d}{dx} y^2 = \frac{d}{dx} 7$$

$$\Rightarrow 2x - \left\{ x \frac{dy}{dx} + y(1) \right\} + 2y \frac{dy}{dx} = 0$$

$$\Rightarrow 2x - x \frac{dy}{dx} - y + 2y \frac{dy}{dx} = 0$$

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

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

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

at point p $(-1, 2)$

$$\Rightarrow M = \frac{dy}{dx} = \frac{2 - 2(-1)}{2(2) - (-1)}$$

$$\Rightarrow \frac{2+2}{4+1} = m = 4/5$$

Now equation of target Line is

$$y - y_1 = m(x - x_1)$$

$$y - 2 = 4/5 (x+1)$$

$$\Rightarrow 5y - 10 = 4x + 4$$

$$= 4x - 5y + 4 + 10 = 0$$

$$= |4x - 5y + 14 = 0|$$

So its slop of target line is $m = -5/4$

equation of normal line is

$$y - y_1 = m_1(x - x_1)$$

$$\Rightarrow y - y_2 = -5/4 (x+1)$$

$$\Rightarrow \quad y-2 = \frac{-5}{4}(x+1)$$

$$4y - 8 = -5x - 5$$

$$5x + 4y - 8 + 5 = 0$$

$$\boxed{5x + 4y - 3 = 0}$$

Ans