3

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Submitted by:- Nusrat Jahan Tanshee
ID :- 2520200011
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1

Ans to the Q no - (1)

$$\Rightarrow \lim_{x \to 0} \frac{\sqrt{1+x}-1}{x} = ?$$

$$\Rightarrow \lim_{x \to 0} \frac{\sqrt{1+x}-1}{1+x-1}$$

$$\Rightarrow \lim_{x \to 0} \frac{\sqrt{1+x}-1}{(\sqrt{1+x})^2-1^2} \qquad \left(\frac{a-b}{a^2-b^2} = \frac{1}{a+b}\right)$$

$$\Rightarrow \lim_{x \to 0} \frac{1}{\sqrt{1+x}+1}$$

$$\Rightarrow \frac{1}{\sqrt{1}+1} = \frac{1}{2} \text{ (Ans)}$$

Ans to the Q no - (2)

$\Rightarrow$ Derivative of $f(x) = x^3 + 5x^2$

Given function: $f(x) = x^3 + 5x^2$

(1) Differentiate the first term x^3 using the power rule,

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

(2) Differentiate the second term $5x^2$ using the power rule,

$$d/dx(5x^2) = 2 \cdot 5x^{2-1} = 10x$$

④ Combine the derivates of the individual terms.

$f'(x) = 3x^2 + 10x$

So, the derivative of $f(x) = x^3 + 5x^2$ with the respect to x is $f'(x) = 3x^2 + 10x$ (Ans)

Ans to the Q no-③

$\Rightarrow \int (2e^x + 6/x + \ln 2)\,dx$

$\Rightarrow 2e^x + 6\ln x + x\ln 2 + c$

$\Rightarrow 2e^x + 6\ln x + x\ln 2 + C$ (Ans)

Ans to the Q no-④

$\Rightarrow$ If $f(x) = x^2 \sin x$, find $f'(x)$

To find $f'(x)$, the derivative of $f(x) = x^2 \sin(x)$, we can use the product rule.

The product rule states that if you have two functions $u(x)$ and $v(x)$, then the derivative of their product $u(x).v(x)$ with respect to x

is given by:

$(u.v)' = u'.v + u.v'$

In this case, we have $u(x) = x^2$ and $v(x) = \sin(x)$

Let's find the derivatives,

$u'(x) = d/dx\,(x^2) = 2x$

$u'(x) = d/dx\,(\sin(x)) = \cos(x)$

Applying the product rule,

$f'(x) = (u.v)' = u'.v + u.v'$

$= (2x).(\sin(x)) + (x^2)(\cos(x))$

$\therefore f'(x) = 2x\sin(x) + x^2\cos(x)$

(Ans.)

Ans to the Q no (5)

The chain rule states that to compute the derivative of f; g∘h, it is a sufficient to compute the derivate of f and the derivative of g∘h.

The reason for the simple form of the chain rule for linear functions is that the derivatives were constants, independent of the value of the inputs to the functions.

There are two forms of it: if f and g differentiable functions, then $(f(g(x)))' = f'(g(x)) \cdot g'(x)$.
if $y = f(u)$ and $u = g(x)$, then $dy/dx = dy/du \, du/dx$.

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