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Ans to the Que NO-1

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

by using Rationalization

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

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

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

$$= \frac{1}{\sqrt{1}+1} = \frac{1}{2}$$ Ans.

Ans to the Que NO:2

Given,

$$f(x) = x^3 + 5x^2$$

differentiating with respect to x, we get

$$f'(x) = \frac{d}{dx}(x^3+5x^2)$$

$$= \frac{d}{dx}(x^3) + 5\frac{d}{dx}(x)^2$$

$$= 3x^2 + 5 \cdot 2x$$

P.T.O

$= 3x^2 + 10x$

$\Rightarrow f'(x) = 3x^2 + 10x$ Ans.

Ans to the Que No 3

$$\int \left(2e^x + \frac{6}{x} + \ln 2\right) dx$$

$$= 2\int e^x dx + 6\int \frac{1}{x} dx + \ln 2 \int dx$$

$$= 2e^x + 6\ln x + \ln 2x + c$$ Ans.

Ans to the Que No -4

$f(x) = x^2 \sin x$

$f'(x) = x^2 \frac{d}{dx}(\sin x) + \sin x \frac{d}{dx}(x)^2$

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

$= x^2 \cos x + 2x \sin x$

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

P.T.O

Ans to the Que NO-5

Chain Rule:-

The chain Rule is used to calculate the derivative of a composite function. The chain rule formula states that,

$$\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}.$$

In words, differentiate the outer function while keeping the inner function the same then multiply this by the derivative of the inner function.

The chain rule is defined as, where u is a function of $x\,(u = g(x))$ and y is a function of $u\,(y = f(u))$.

Alternatively, the chain rule can be written in function notation as

$$F'(x) = f'g(x)) \cdot g'(x), \text{where } F(x) = f(g(x)).$$

g(x) is the inner function and f(x) is the outter function. In words, the chain rule requires finding the derivative of the outer function while keeping the inner function the same and then multiplying this by the derivative of the inner function.

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