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8th Batch - CSE

courseTitle : Differential EDucation and Fourier Analysis

course code : MAT 325

Ans : the : Q : NO : 01

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

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

$$\Rightarrow \lim_{x \to 0} \frac{(\sqrt{1+x})^2 - (1)^2}{x(\sqrt{1+x} + 1)}$$

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

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

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

Ans: to the Q: NO: 02

Ans: Finding the derivative of $f(x) = x^3 + 5x^2$

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

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

Ans!

Ans: to the Q: NO: 03

Ans: $\int (2e^x + \frac{6}{x} + \ln 2)\, dx$

$$= 2e^x + 6\ln x + x\ln 2 + C$$

$$= 2e^x + 6\ln x + x\ln 2 + C$$

Ans!

Ans: to the Q: NO: 04

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

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

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

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

Ans: the: of: NO: 05

In calculus, The chain rule is a theorem is a formula that expresses the derivative of the composition of two differentiable functions f and g in terms of the derivatives of f & g. More precisely, if $h = f \circ g$ is the function such that $h(x) = f(g(x))$ for every x, then the chain rule is, in Lagrange's notation,

$$h'(x) = f'(g(x))\, g'(x).$$

or equivalently

$$h' = (f \circ g)' = (f' \circ g) \cdot g'.$$

The chain rule may also be expressed in Leibniz's notation. In the xyz case, the chain rule is expressed as

$$\frac{dz}{dx} = \frac{dz}{dy} \cdot \frac{dy}{dx}$$

& $$\left.\frac{dz}{dx}\right|_x = \left.\frac{dz}{dy}\right|_{y(x)} \cdot \left.\frac{dy}{dx}\right|_x,$$

In Integration, the counterpart to the chain rule is the substitution rule.