Mathematics Assignment For Class XII

General Directions For Students :Whatever be the notes provided , everything must be copied in the maths copy and then do the homework in the same copy

Chapter 5: Exercise 5.5 & 5.6 (Part -1)

Topic : Derivative of composite functions

- Chain rule allows the differentiation of composite function
- The derivatives of a composite function can be said as the derivatives of the outer function which we multiply by the derivatives of the inner function.
- If f(x) & g(x) are two function

$$\frac{d}{dx}\left[\left(f(x)\right)^n\right]=n\left(f(x)\right)^{n-1}.f'(x) \text{ or } \frac{d}{dx}\left[\left(f(g(x)\right)^n\right]=f'\left(g(x)\right).g'(x)$$

Exercise 5.6. Q2.ii) Differentiate $(3x^2-9x+5)^9$

solution. Let $y=(3x^2-9x+5)^9$

so $\frac{dy}{dx}=9(3x^2-9x+5)^8\frac{d}{dx}(3x^2-9x+5)$

$\Rightarrow 9(3x^2-9x+5)^8(6x-9)$

$\Rightarrow 27(3x^2-9x+5)^8(2x-3)$

Ex 5.6.Q3ii) Differentiate $\sin^3x+\cos^6x$

solution. Let $y=\sin^3x+\cos^6x$

$$\frac{dy}{dx}=3\sin^2 x\frac{d}{dx}(\sin x)+6\cos^5 x\frac{d}{dx}(\cos x)$$

$\Rightarrow 3\sin^2 x\cos x+6\cos^5 x(-\sin x)$

$\Rightarrow 3\sin^2 x\cos x-6\cos^5 x\sin x$

$\Rightarrow 3\sin x\cos x(\sin x-2\cos^4 x)$

Ex 5.6.Q7.ii) Differentiate $\sqrt{\tan\sqrt{x}}$

solution. Let $y=\sqrt{\tan\sqrt{x}}$

$$\frac{dy}{dx}=\frac{1}{2\sqrt{\tan\sqrt{x}}}\frac{d}{d\sqrt{x}}(\tan\sqrt{x})\frac{d}{dx}(\sqrt{x})$$

$$=\frac{1}{2\sqrt{\tan\sqrt{x}}}.\sec^2\sqrt{x}\,\frac{d}{dx}(\sqrt{x})$$

$$=\frac{1}{2\sqrt{\tan\sqrt{x}}}.\sec^2\sqrt{x}.\frac{1}{2\sqrt{x}}$$

$$=\frac{\sec^2\sqrt{x}}{4\sqrt{x}\sqrt{\tan\sqrt{x}}}$$ Ans

Ex 5.6.Q13.ii) Differentiate $\sin^n(ax^2+bx+c)$

solution. Let $y=\sin^n(ax^2+bx+c)$

$$\frac{dy}{dx}=n\sin^{n-1}(ax^2+bx+c)\frac{d}{d(ax^2+bx+c)}(\sin(ax+bx+c)\frac{d}{dx}(ax^2+bx+c)$$
$$=n(2ax+b)\sin^{n-1}(ax^2+bx+c)\cos(ax^2+bx+c)$$

Ex 5.6.Q19.ii) Differentiate $|\cos x|$ w.r.t. x.

Let $y=|\cos x|$

$$\frac{dy}{dx}=\frac{\cos x}{|\cos x|}.\frac{d}{dx}(\cos x)$$
$$=\frac{\cos x}{|\cos x|}.(-\sin x),\cos x\neq 0$$
$$=-\frac{\cos x}{|\cos x|}.(\sin x),x\neq(2n+1)\frac{\pi}{2},$$ n is any integer

The given function is not differentiable at $x=(2n+1)\frac{\pi}{2}$ only where n is any integer

$\cos|x|$ is differentiable because cos(-x)= cos x

Homework:

Exercise 5.6. Q.3i),Q.7.i), Q.11i). Q.13.i),Q.14.ii)Q.16.ii)

Solution of the following questions are discussed in the video link provided to you with this assignment

Ex 5.5: Q1.ii), Q4.ii), Q6.i), Q7.ii), Q8.

Ex5.6: Q.1.ii),Q.4i), Q.6.ii), Q.9, Q14.i),Q.17,Q18.