Differentiation Ex 11.2 Q52

Consider

$$y=\frac{x^2\left(1-x^2\right)^3}{\cos 2x}$$

Differentiating it with respect to x and applying the chain and product rule, we get

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

$$=\frac{\cos 2x\left[x^2\frac{d}{dx}\left(1-x^2\right)^3+\left(1-x^2\right)^3\frac{d}{dx}x^2-x^2\left(1-x^2\right)^3\left(-2\sin 2x\right)\right]}{\cos^2 2x}$$

$$=\frac{\cos 2x\left[-6x^3\left(1-x^2\right)^2+\left(1-x^2\right)^3 2x+2x^2\left(1-x^2\right)^3\sin 2x\right]}{\cos^2 2x}$$

$$=\frac{2x\left(1-x^2\right)^2}{\cos 2x}-\frac{6x^3\left(1-x^2\right)^2}{\cos 2x}+\frac{2x^2\left(1-x^2\right)^3\sin 2x}{\cos^2 2x}$$

$$=2x\left(1-x^2\right)\sec 2x\left\{1-4x^2+x\left(1-x^2\right)\tan 2x\right\}$$

Therefore,

$$\frac{dy}{dx}=2x\left(1-x^2\right)\sec 2x\left\{1-4x^2+x\left(1-x^2\right)\tan 2x\right\}$$

Differentiation Ex 11.2 Q53

Consider

$$y=\log\left(3x+2\right)-x^2\log\left(2x-1\right)$$

Differentiating it with respect to x and applying the chain and product rule, we get

$$\frac{dy}{dx}=\frac{d}{dx}\left[\log\left(3x+2\right)-x^2\log\left(2x-1\right)\right]$$

$$\frac{dy}{dx}=\frac{3}{3x+2}-\left[x^2\frac{d}{dx}\log\left(2x-1\right)+\log\left(2x-1\right)\frac{d}{dx}x^2\right]$$

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

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

Therefore,

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

Differentiation Ex 11.2 Q54

Consider

$$y=e^{ax}\sec x\tan 2x$$

Differentiating it with respect to x and applying the chain and product rule, we get

$$\frac{dy}{dx}=\frac{d}{dx}\left(e^{ax}\sec x\tan 2x\right)$$

$$=e^{ax}\frac{d}{dx}\sec x\tan 2x+\sec x\tan 2x\frac{d}{dx}e^{ax}$$

$$=e^{ax}\left[\sec x\tan x\tan 2x+\left(2+2\tan^2 2x\right)\sec x\right]+ae^{ax}\sec x\tan 2x$$

$$=e^{ax}\left[\sec x\tan x\tan 2x+2\sec x+2\tan^2 2x\sec x\right]+ae^{ax}\sec x\tan 2x$$

$$=ae^{ax}\sec x\tan 2x+e^{ax}\sec x\tan x\tan 2x+e^{ax}\sec x\left(2+2\tan^2 2x\right)$$

$$\frac{dy}{dx}=e^{ax}\sec x\left\{a\tan 2x+\tan x\tan 2x+2\sec^2 2x\right\}$$

Therefore,

$$\frac{dy}{dx}=e^{ax}\sec x\left\{a\tan 2x+\tan x\tan 2x+2\sec^2 2x\right\}$$

Differentiation Ex 11.2 Q55

Consider

$$y = \log\left(\cos x^2\right)$$

Differentiating it with respect to x and applying the chain and product rule, we get

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

$$= \frac{-2x\sin x^2}{\cos x^2}$$

$$\frac{dy}{dx} = -2x\tan x^2$$

Therefore,

$$\frac{dy}{dx} = -2x\tan x^2$$

Differentiation Ex 11.2 Q56

Consider

$$y = \cos(\log x)^2$$

Differentiating it with respect to x and applying the chain and product rule, we get

$$\frac{dy}{dx} = \frac{d}{dx}\cos(\log x)^2$$

$$= -\sin(\log x)^2 \frac{d}{dx}(\log x)^2$$

$$= -\sin(\log x)^2 \frac{2\log x}{x}$$

$$\frac{dy}{dx} = \frac{-2\log x \sin(\log x)^2}{x}$$

Therefore,

$$\frac{dy}{dx} = \frac{-2\log x \sin(\log x)^2}{x}$$

*********** END **********