



Differentiation Ex 11.2 Q52

Consider

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

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

$$\begin{aligned} \frac{dy}{dx} &= \frac{\cos 2x \frac{d}{dx} x^2(1-x^2)^3 - x^2(1-x^2)^3 \frac{d}{dx} \cos 2x}{\cos^2 2x} \\ &= \frac{\cos 2x \left[x^2 \frac{d}{dx} (1-x^2)^3 + (1-x^2)^3 \frac{d}{dx} x^2 - x^2(1-x^2)^3 (-2 \sin 2x) \right]}{\cos^2 2x} \\ &= \frac{\cos 2x \left[-6x^3(1-x^2)^2 + (1-x^2)^3 2x + 2x^2(1-x^2)^3 \sin 2x \right]}{\cos^2 2x} \\ &= \frac{2x(1-x^2)^2}{\cos 2x} - \frac{6x^3(1-x^2)^2}{\cos 2x} + \frac{2x^2(1-x^2)^3 \sin 2x}{\cos^2 2x} \\ &= 2x(1-x^2) \sec 2x \{1-4x^2+x(1-x^2) \tan 2x\} \end{aligned}$$

Therefore,

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

Differentiation Ex 11.2 Q53

Consider

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

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

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

Therefore,

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

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

$$\begin{aligned} \frac{dy}{dx} &= \frac{d}{dx} (e^{ax} \sec x \tan 2x) \\ &= e^{ax} \frac{d}{dx} \sec x \tan 2x + \sec x \tan 2x \frac{d}{dx} e^{ax} \\ &= e^{ax} [\sec x \tan x \tan 2x + (2 + 2 \tan^2 2x) \sec x] + a e^{ax} \sec x \tan 2x \\ &= e^{ax} [\sec x \tan x \tan 2x + 2 \sec x + 2 \tan^2 2x \sec x] + a e^{ax} \sec x \tan 2x \\ &= a e^{ax} \sec x \tan 2x + e^{ax} \sec x \tan x \tan 2x + e^{ax} \sec x (2 + 2 \tan^2 2x) \\ \frac{dy}{dx} &= e^{ax} \sec x \{a \tan 2x + \tan x \tan 2x + 2 \sec^2 2x\} \end{aligned}$$

Therefore,

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

Differentiation Ex 11.2 Q55

Consider

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

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

$$\begin{aligned}\frac{dy}{dx} &= \frac{d}{dx} \log(\cos x^2) \\ &= \frac{-2x \sin x^2}{\cos x^2}\end{aligned}$$

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

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

$$\begin{aligned}\frac{dy}{dx} &= \frac{d}{dx} \cos(\log x)^2 \\ &= -\sin(\log x)^2 \frac{d}{dx} (\log x)^2 \\ &= -\sin(\log x)^2 \frac{2 \log x}{x}\end{aligned}$$

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

Therefore,

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

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