

MTH101 Practice Questions
Lecture No.16: Techniques of Differentiation

Q.No.1: Differentiate $g(t) = \frac{t^2 + 4}{2t}$.

Answer: $\frac{t^2 - 4}{2t^2}$

Q.No.2: Evaluate $\frac{d}{dx}((x+1)(1+\sqrt{x}))$ at $x = 9$.

Answer: $\frac{17}{3}$

Q.No.3: Differentiate the following functions:

Answer:

i. $4x + 3\sqrt{x} + \frac{1}{2\sqrt{x}} + 1$

ii. $-35x^{-8} - 9x^{-4}$

iii. $\frac{4x^4 + 3x^2 - 8x}{(4x^2 + 1)^2}$

MTH101 Practice Questions
Lecture No.17: Derivatives of Trigonometric Function

Q.No.1: Find $\frac{dy}{dx}$ if $y = x^3 \cot x - \frac{3}{x^3}$.

Answer: $3x^2 \cot x - x^3 \operatorname{cosec}^2 x + \frac{9}{x^4}$

Q.No.2: Find $\frac{dy}{dx}$ if $y = x^4 \sin x$ at $x = \pi$.

Answer: $-\pi^4$

Q.No.3: Find $f'(t)$ if $f(t) = \frac{2-8t+t^2}{\sin t}$.

Answer: $\frac{[(2t-8)(\sin t)] - [(t^2-8t+2)(\cos t)]}{\sin^2 t}$

Q.No.4: Find $f'(y)$ if $(y) = \frac{\sin y + 3 \tan y}{y^3 - 2}$.

Answer: $\frac{[(y^3-2)(\cos y + 3 \sec^2 y)] - [(\sin y + 3 \tan y) + (3y^2)]}{y^6 - 4y^3 + 4}$

Q.No.5: (a) Find $\frac{dy}{dx}$ if $y = (5x^2 + 3x + 3)(\sin x)$.

(b) Find $f'(t)$ if $(t) = 5t \sin t$.

Answer: (a) $(5x^2 + 3x + 3)(\cos x) + \sin x \cdot (10x + 3)$

(b) $5t \cos t + 5 \sin t$

MTH101 Practice Questions
Lecture No.18: The Chain Rule

Q.No.1: Differentiate $y = \sqrt{5x^3 - 3x^2 + x}$ with respect to “ x ” using the chain rule.

Answer:
$$\frac{dy}{dx} = \frac{1}{2\sqrt{5x^3 - 3x^2 + x}} (15x^2 - 6x + 1)$$

Q.No.2: Differentiate $y = \tan \sqrt{x} + \cos \sqrt{x}$ with respect to “ x ” using the chain rule.

Answer:
$$\frac{dy}{dx} = \frac{1}{2\sqrt{x}} (\sec^2 \sqrt{x} - \sin \sqrt{x})$$

Q.No.3: Differentiate $y = 3\sin^2 x^5 + 4\cos^2 x^5$ with respect to “ x ” using the chain rule.

Answer:
$$\frac{dy}{dx} = -10x^4 (\cos x^5 \sin x^5)$$

Q.No.4: Find $\frac{dy}{dx}$ if $y = \sqrt{\sec 4x}$ using chain rule.

Answer:
$$\frac{dy}{dx} = 2\sqrt{\sec 4x} \tan 4x$$

Q.No.5: Find $\frac{dy}{dt}$ if $y = \tan t^{\frac{2}{3}}$ using chain rule.

Answer:
$$\frac{dy}{dt} = \frac{2}{3t^{\frac{1}{3}}} \sec^2 t^{\frac{2}{3}}$$