

**MTH101: Practice Exercise**  
**Lecture No.17: Derivatives of Trigonometric Functions**

**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)  $5t \cos t + 5 \sin t$