

National Institute of Open Schooling (NIOS)
Senior Secondary Course
Lesson – 29: Applications of Derivatives
Worksheet -29

1. Find the rate of change of the total surface area of a cylinder of radius (r) and height (h), when the radius varies
2. The radius of a circle is increasing uniformly at the rate of 5 cm/sec. Find the rate at which the area of the circle is increasing when the radius is 10 cm.
3. Discuss the applicability of Rolle's theorem on the function

$$f(x) = \begin{cases} x^2 + 1, & \text{when } 0 \leq x \leq 1 \\ 3 - x, & \text{when } 1 \leq x \leq 2 \end{cases}$$

4. Find the point on the curve $y = \frac{x}{1+x^2}$, where the tangent to the curve has the greatest slope.
5. If x is a real, find the minimum value of $x^2 - 8x + 17$
6. Find the local maxima and local minimum of the function $f(x) = \sin x - \cos x, 0 < x < 2\pi$. Also find the local maxima and local minimum value.
7. PQ is the diameter of a circle and R is any point on the circle. Show that the area of triangle PQR is maximum, when it is an isosceles triangle.
8. Show that the local maximum value of $x + \frac{1}{x}$ is less than local minimum value.
9. Find the slope of tangent to the curve $x = a(\theta - \sin \theta), y = a(1 - \cos \theta)$ at $\theta = \frac{\pi}{2}$
10. Find the equation of tangent to the curve $y = x^2 - 2x + 7$, which is perpendicular to the line $5y - 15x = 13$