

# Assignment (Group 4)

## Calculus and Analytical Geometry

### Energy and Environment - Batch 15

---

---

1. Define extreme points of function  $f(x)$ . Find the points on curve  $y = x^2 + 1$  which are closest to the point  $(0, 2)$ .

2. Give an example to explain the chain rule method for finding derivative.

3. Find all the second order derivatives(i.e.  $f_{xx}$  and  $f_{yy}$ ) for the function

$$f(x, y) = \cos(2x) - x^2e^{5y} + 3y^2.$$

4. Given the function  $f(x) = \sin(x)$  between  $x = 0$  and  $x = 2\pi$ . Compute

(a) the definite integral of  $f(x)$  over the interval  $[0, 2\pi]$ .

(b) the area between the graph of  $f(x)$  and the x-axis over the interval  $[0, 2\pi]$ .

5. Solve the following integral

$$\int \sqrt{1 + \cos^2(x - 1)} \sin(x - 1) \cos(x - 1) dx.$$

6. Define *radius of curvature*. Calculate the radius curvature at point  $(\frac{1}{2}, 1)$  of the curve given by equation  $y^2 = 2x$ .