

Assignment (Group 1)

Calculus and Analytical Geometry

Energy and Environment - Batch 15

1. Show that function $y = \sin(\frac{1}{x})$ has no limit as x approaches to zero i.e. $x \rightarrow 0$. Interpret your understanding graphically.

2. Find all possible values of n if given function $z = \frac{xe^{2x}}{y^n}$ satisfy the equation

$$3x \frac{\partial^2 z}{\partial x^2} - xy^2 \frac{\partial^2 z}{\partial y^2} = 12z.$$

3. What do you mean by *definite* and *indefinite* integration? What are the applications of integration?

4. Solve the following integral

$$\int \frac{(2r - 1) \cos(\sqrt{3(2r - 1)^2 + 6})}{\sqrt{3(2r - 1)^2 + 6}} dr.$$

5. For what value or values of the constant k will the curve $y = x^3 + kx^2 + 3x - 4$ have exactly one horizontal tangent? [Note: For any curve $y = f(x)$, $\frac{dy}{dx}|_{x=a} = y'(a)$ is the slope of tangent line]

6. Suppose that it costs a company $y = a + bx$ USD to produce x units per week. Company sells x units per week at a price of $P = c - dx$ dollars per unit. Each of a , b , c , and d is a positive constant.

(a) What production level maximizes the profit?

(b) What is the corresponding price?