

Assignment 3:

1. Find the curvature \mathbf{K} of the curve
$$y = (e^t \cos t)i + (e^t \sin t)j + e^t k$$

2. Find (if possible)

$$\text{i) } \lim_{(x,y,z) \rightarrow (1,0,1)} \frac{xy - z}{\cos(xyz)}$$

$$\text{ii) } \lim_{(x,y) \rightarrow (0,0)} \frac{x^2 - y^2}{\sqrt{x^2 + y^2}}$$

$$\text{iii) } \lim_{(x,y) \rightarrow (0,0)} \frac{x^2 - y^2}{x^2 + y^2}$$

3. Describe the region that is the domain of the function

$$f(x, y) = \ln(x^2 + y^2 - 1)$$

4. Find

i) $\frac{\partial f}{\partial x}, \frac{\partial f}{\partial y}, \frac{\partial f}{\partial z}$ for $f(x, y, z) = x \sin(y^2 + z^2)$

ii) $\frac{\partial f}{\partial x}, \frac{\partial f}{\partial y}, \frac{\partial f}{\partial z}$ at $(1, -1, 2)$ for $f(x, y, z) = z^{xy}$