

Quiz 9.

$$Q1. \frac{df}{dr} \& \frac{df}{ds} \quad f(x, y) = x^2 + 2xy^2 + 2y^3$$

$$x = r + 2s \quad y = 3r + 2s.$$

Answer:

$$\frac{df}{dr} = \frac{df}{dx} \cdot \frac{dx}{dr} + \frac{df}{dy} \cdot \frac{dy}{dr}$$

$$= (2x + 2y^2) \cdot 1 + (4xy + 6y^2) \cdot 3 = 2x + 4xy + 20y^2$$

$$\frac{df}{ds} = \frac{df}{dx} \cdot \frac{dx}{ds} + \frac{df}{dy} \cdot \frac{dy}{ds} = (2x + 2y^2) \cdot 2 + (4xy + 6y^2) \cdot 2$$

$$= 4x + 8xy + 12y^2$$

$$Q2. \frac{dz}{dx} \& \frac{dz}{dy} ? \quad (x^2 + y^2 + z^2 = 5xyz + 1)$$

$$x^2 + y^2 + z^2 - 5xyz - 1 = 0$$

$$\frac{dz}{dx} : 2x + 2z \cdot \frac{dz}{dx} - 5yz - 5xy \frac{dz}{dx} = 0$$

$$\frac{dz}{dx} (2z - 5xy) = \frac{5yz - 2x}{1}$$

$$\frac{dz}{dx} = \frac{5yz - 2x}{2z - 5xy}$$

$$\frac{dz}{dy} : 2y + 2z \cdot \frac{dz}{dy} - 5xz - 5xy \frac{dz}{dy} = 0$$

$$(2z - 5xy) \frac{dz}{dy} = 5xz - 2y$$

$$\frac{dz}{dy} = \frac{5xz - 2y}{2z - 5xy}$$

