

Yash Khargura Q. 7 for Lecture 7 Section 24

1.) compute the partial derivatives with respect to x and y

$$z = \ln(x^2 + y^2)$$

$$f_x(x, y) = \frac{2x}{x^2 + y^2}$$

$$f_y(x, y) = \frac{2y}{x^2 + y^2}$$

2.) Find an equation of the tangent plane to the given surface at the specified point.

$$z = x^2 + y^2 + z \quad (1, 1, 4)$$

$$f_x(x, y) = 2x$$

$$f_x(1, 1) = 2 \rightarrow \langle 1, 0, 2 \rangle$$

$$f_y(x, y) = 2y$$

$$f_y(1, 1) = 2 \rightarrow \langle 0, 1, 2 \rangle$$

} normal vector: $\langle 2, 2, 1 \rangle$

$$\text{Tangent plane: } -2(x-1) - 2(y-1) + 1(z-4) = 0$$

$$-2x + 2 - 2y + 2 + z - 4 = 0$$

$$-2x - 2y + z = 0 \quad \text{or} \quad z - 4 = 2(x-1) + 2(y-1) \quad \text{or}$$

$$z = 2x + 2y$$