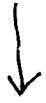


PROBLEM: Find equation of tangent plane to $z = f(x, y)$ at the point $(a, b, f(a, b))$.

① The vertical plane $x=a$ cuts the graph in a curve C :

$$\vec{r}(y) = \langle a, y, f(a, y) \rangle$$



② $\left. \frac{d\vec{r}}{dy} \right|_{y=b} = \langle 0, 1, f_y(a, b) \rangle$

is a tangent vector to C at $(a, b, f(a, b))$.



③ $\vec{N} = \langle 1, 0, f_x(a, b) \rangle \times \langle 0, 1, f_y(a, b) \rangle$

$$= \langle -f_x(a, b), -f_y(a, b), 1 \rangle$$

is a normal vector to the tangent plane.



④ Equation of tangent plane is

$$(-f_x(a, b))(x-a) + (-f_y(a, b))(y-b) + (1)(z-f(a, b)) = 0$$

OR

TANGENT
PLANE

$$z = f(a, b) + f_x(a, b)(x-a) + f_y(a, b)(y-b)$$

① The vertical plane $y=b$ cuts the graph in a curve D :

$$\vec{r}(x) = \langle x, b, f(x, b) \rangle$$



② $\left. \frac{d\vec{r}}{dx} \right|_{x=a} = \langle 1, 0, f_x(a, b) \rangle$

is a tangent vector to D at $(a, b, f(a, b))$.

