MORE PLANES – ANSWERS

Use partial derivatives to find the equation for the tangent plane at the indicated point. Write your answer in the form $z = Ax + By + C$.

$$z = z_x(a,b)(x-a) + z_y(a,b)(y-b) + z(a,b)$$

1. $z = x^4 + y^4$, $P = (1,1,2)$

$z_x = 4x^3$, $z_x(1,1) = 4$

$z_y = 4y^3$, $z_y(1,1) = 4$

$z = 4(x-1) + 4(y-1) + 2 = 4x - 4 + 4y - 4 + 2$

$z = 4x + 4y - 6$

2. $z = \sqrt[3]{x^2 y}$, $P = (2,2,2)$

$z_x = \dfrac{2xy}{3(x^2y)^{2/3}}$, $z_x(2,2) = \dfrac{2}{3}$

$z_y = \dfrac{x^2}{3(x^2y)^{2/3}}$, $z_y(2,2) = \dfrac{1}{3}$

$z = \dfrac{2}{3}(x-2) + \dfrac{1}{3}(y-2) + 2 = \dfrac{2}{3}x - \dfrac{4}{3} + \dfrac{1}{3}y - \dfrac{2}{3} + 2$

$z = \dfrac{2}{3}x + \dfrac{1}{3}y$

3. $z = \dfrac{x}{y}$, $P = (2,1,2)$

$z_x = \dfrac{1}{y}$, $z_x(2,1) = 1$

$z_y = -\dfrac{x}{y^2}$, $z_y(2,1) = -2$

$z = 1 \cdot (x-2) - 2(y-1) + 2 = x - 2 - 2y + 2 + 2$

$z = x - 2y + 2$