

Answer on Question 38001 – Math – Calculus

Find the equation of the tangent plane to the hyperboloid $x^2/a^2 + y^2/b^2 - z^2/c^2 = 1$ at (x_0, y_0, z_0)

If we have a surface equation $F(x, y, z) = 0$ then the equation of tangent plane to this surface at (x_0, y_0, z_0) we can find using the following formula

$$F_x(x_0, y_0, z_0)(x - x_0) + F_y(x_0, y_0, z_0)(y - y_0) + F_z(x_0, y_0, z_0)(z - z_0) = 0.$$

Therefore we obtain

$$\frac{2x(x - x_0)}{a^2} + \frac{2y(y - y_0)}{b^2} - \frac{2z(z - z_0)}{c^2} = 0$$

Or

$$\frac{x(x - x_0)}{a^2} + \frac{y(y - y_0)}{b^2} - \frac{z(z - z_0)}{c^2} = 0$$

Answer: $\frac{x(x - x_0)}{a^2} + \frac{y(y - y_0)}{b^2} - \frac{z(z - z_0)}{c^2} = 0.$