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MAC 2313 Quiz 12
Tuesday March 5th

Find an equation of the tangent plane to the surface

$$x^2 + y^3 + z^4 = 2$$

at the point $(-1, 0, 1)$.

The given surface is a level surface for $f(x, y, z) = x^2 + y^3 + z^4$
 $\Rightarrow f_x = 2x, f_y = 3y^2, f_z = 4z^3. \nabla f = (2x, 3y^2, 4z^3).$

At the point $(-1, 0, 1)$ we have $\nabla f = (-2, 0, 4)$.

We know gradient is normal to surface and to tangent plane.

Equation of tangent plane is

$$-2(x - (-1)) + 0(y - 0) + 4(z - 1) = 0$$

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

$$\text{or } -2x - 2 + 4z - 4 = 0$$

$$\text{or } -2x + 4z - 6 = 0 \quad \text{or } -2x + 4z = 6$$

$$\text{or } -x + 2z = 3$$

$$\text{or } 2z - x = 3$$