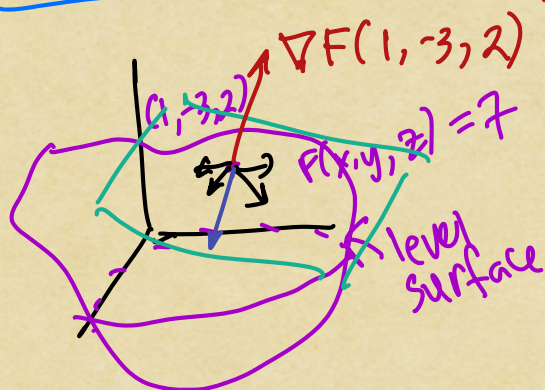


Let $w = F(x, y, z) = 4x^2 - y^2 + 3z^2$. Find the equation of the plane tangent to the level surface $F(x, y, z) = 7$ at the point $(1, -3, 2)$.

implicit eq'n for surface



$$4(1)^2 - (-3)^2 + 3(2)^2$$

$$= 4 - 9 + 12$$

$$= -5 + 12 = 7.$$

$$\nabla F = \langle 8x, -2y, 6z \rangle$$

$$\nabla F(1, -3, 2) = \langle 8, 6, 12 \rangle$$

eq'n of tangent plane:

$$8(x-1) + 6(y+3) + 12(z-2) = 0.$$

$$\underline{8}x - 8 + \underline{6}y + 18 + \underline{12}z - 24 = 0$$

$$8x + 6y + 12z = 14$$

$$ax + by + cz = d$$

$$4x + 3y + 6z = 7$$