

HOMEWORK #3 (Chapter 9 Vector Calculus)

(1). In this problem, describe the level surfaces but do not graph. $F(x, y, z) = x^2 + 3y^2 + 6z^2$
(Exercises 9.4 problem 9).

Ans: $x^2 + 3y^2 + 6z^2 = c$; ellipsoid

(2). Given that $F(x, y, z) = \frac{x^2}{16} + \frac{y^2}{4} + \frac{z^2}{9}$, find the x -, y -, and z -intercepts of the level surface that passes through $(-4, 2, -3)$. (Exercises 9.4 problem 12).

Ans: Setting $x = -4$, $y = 2$ and $z = -3$ in $\frac{x^2}{16} + \frac{y^2}{4} + \frac{z^2}{9} = c$, we obtain $c = 3$.

Setting $y = z = 0$ in $\frac{x^2}{16} + \frac{y^2}{4} + \frac{z^2}{9} = 3$, we find the x -intercepts are $\pm 4\sqrt{3}$.

Setting $z = x = 0$ in $\frac{x^2}{16} + \frac{y^2}{4} + \frac{z^2}{9} = 3$, we find the y -intercepts are $\pm 2\sqrt{3}$.

Setting $y = x = 0$ in $\frac{x^2}{16} + \frac{y^2}{4} + \frac{z^2}{9} = 3$, we find the z -intercepts are $\pm 3\sqrt{3}$.