

Math 213 Discussion Worksheet – Week 5

Starred problems are optional

1. Indicate the types (ellipsoid/elliptic cone/elliptic paraboloid/hyperbolic paraboloid/hyperboloid of one sheet/hyperboloid of two sheets) of the following equations.

(a) $x^2 - y^2 - z^2 = 1$ (b) $x^2 + y^2 - z^2 = 1$ (c) $x^2 + y^2 - z^2 = 0$ (d) $x - y^2 - z^2 = 0$ (e) $x - y^2 + z^2 = 0$.

2. Describe the traces of $z^2 = x^2 + y^2$ in the given planes.

(a) $y = 1$ (b) $z = 1$ (c) $x = 0$ (d)* $z - y = 1$ (e)* $z - y = 0$ (f)* $2z - y = 1$.

3. Sketch a contour map of the surface using level curves for the given c -values.

(a) $z = 2 - 2x - y$, $c = -2, 0, 2, 4$

(b) $z = e^{-x^2 - y^2}$, $c = 1, e^{-1}, e^{-4}$.

4. Let $f(x, y) = xye^{-x-y}$ and $g(x, y) = \frac{x}{\sqrt{x^2 + y^2}}$.

(a) Find $f_{xx}(x, y)$ and $f_{xy}(x, y)$

(b) Find $g_x(1, 0)$ and $g_y(1, 0)$.