Day 2 Homework

Definition 2. Given an equation \( f(x, y, z) = \text{“constant”} \) (for example Equation (1) has this form), we can set \( z = k \) (with \( k \) a constant) to obtain an equation involving only \( x \) and \( y \) as variables. The resulting graph is called a \textit{trace in the plane} \( z = k \). We can similarly set \( x \) or \( y \) equal to constants to obtain \textit{traces in planes} \( x = k \) or \( y = k \).

Draw \( x \)-traces, \( y \)-traces, and \( z \)-traces for each of the following quadric surfaces. Explicitly, for each surface and each variable \( (x, y, \text{and } z) \), draw the trace at 0, then draw the trace for at least one negative number of your choosing, and at least one positive number of your choosing.

After drawing traces, do your best to sketch the quadric surface in 3-dimensions.

Problem 12. \( x = y^2 + 4z^2 \)

Problem 13. \( 3x^2 - y^2 + 3z^2 = 0 \)

Problem 14. \( y = z^2 - x^2 \)