

Math 2415
Paper Homework #4

1. **[12.6: Quadric Surfaces]** Make a labelled sketch of the slices/traces of the surface

$$y^2 - 4x^2 - z^2 = 1$$

in the planes $x = 0$, $z = 0$, and $y = k$ for $k = 0, \pm 1, \pm 2$. Then sketch the surface.

2. **[12.6: Quadric Surfaces]** Use the surface of revolution method to sketch the surface $x^2 - 4y^2 + z^2 = 1$.
3. **[13.1: Parametrized Curves]** Parametrize the curve obtained by intersecting the plane $x + z = 1$ with the paraboloid $y = x^2 + z^2$. Make a single sketch showing both surfaces and their curve of intersection.
4. **[13.1: Parametrized Curves]** Show that the curve with parametrization $x = \sin t$, $y = \cos t$, $z = \cos 2t$ lies on a saddle surface and on a cylinder. In particular, find equations for these two surfaces.