

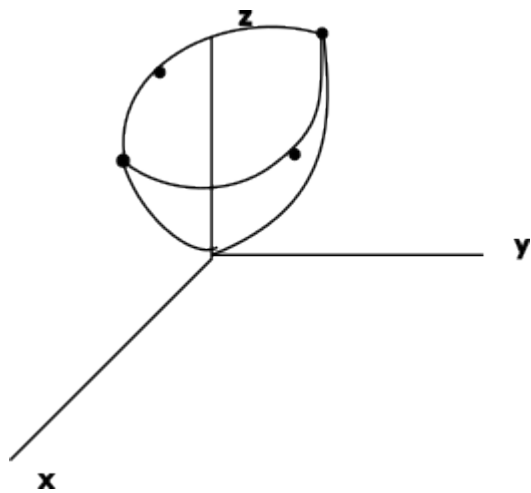
1 Vectors and Surfaces

Quadric Surfaces

Ellipsoid: $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$

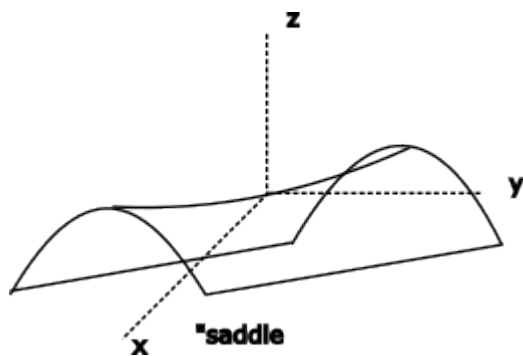
Elliptic Paraboloid: $\frac{z}{c} = \frac{x^2}{a^2} + \frac{y^2}{b^2}$

- Horizontal traces are ellipses
- Vertical traces are parabolas



Hyperbolic Paraboloid: $\frac{z}{c} = \frac{x^2}{a^2} - \frac{y^2}{b^2}$

- Horizontal traces are hyperbolas
- Vertical traces are parabolas



Cone: $\frac{z^2}{c^2} = \frac{x^2}{a^2} + \frac{y^2}{b^2}$

Hyperboloid of One Sheet: $\frac{x^2}{a^2} + \frac{y^2}{b^2} - \frac{z^2}{c^2} = 1$

Hyperboloid of Two Sheets: $\frac{-x^2}{a^2} - \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$

Ex: Put the equation in standard form and classify the surface.

$$\frac{x^2}{y^2} \tag{1}$$