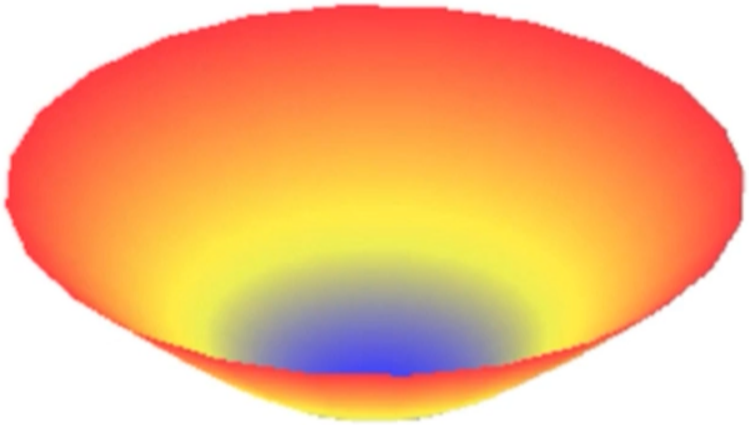
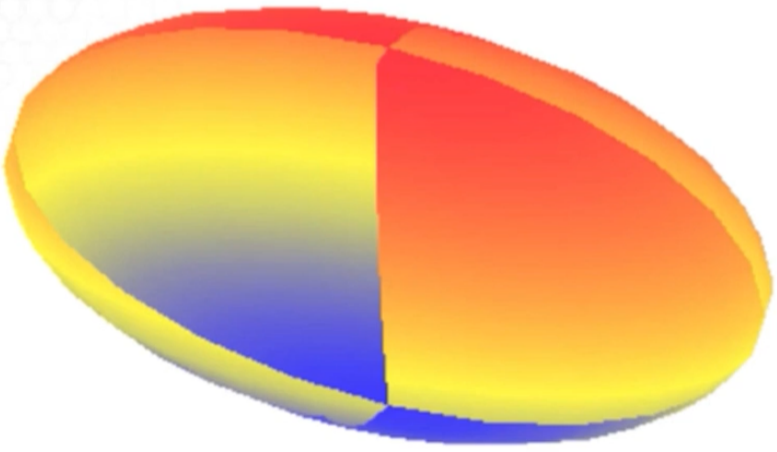
Quadric Surfaces

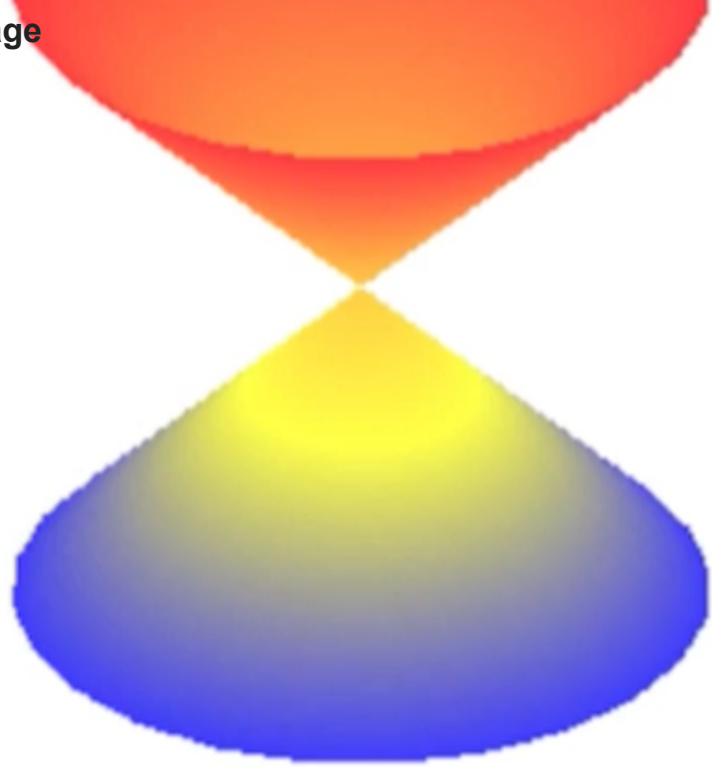
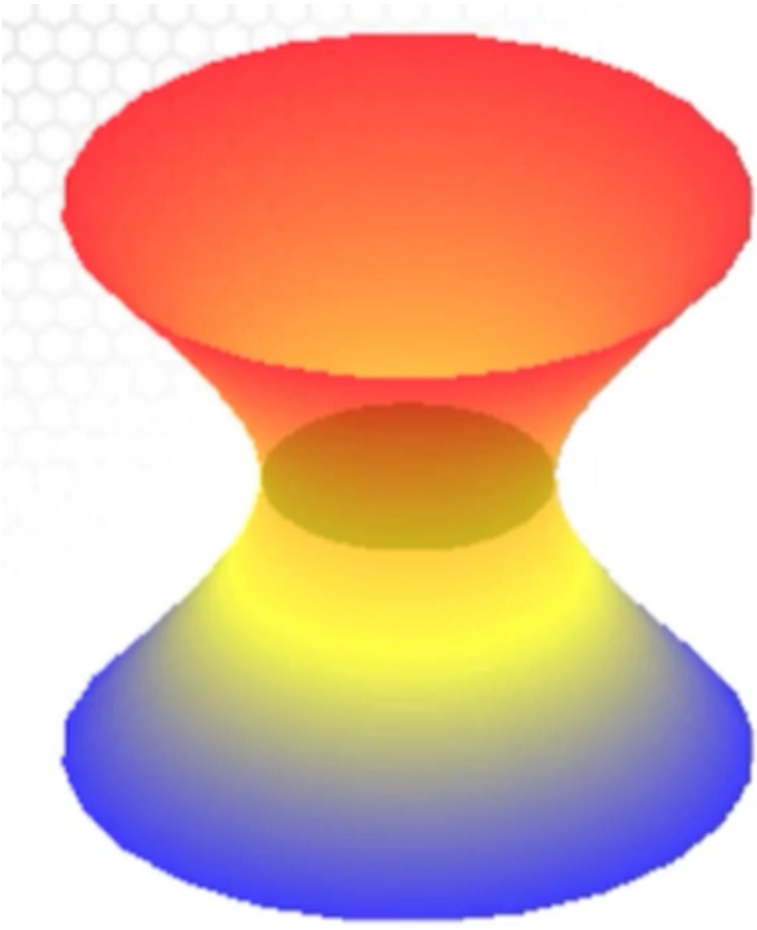
Cylinder -- A surface that is generated by moving a straight line along a given planar curve while holding the line parallel to a given fixed line. The curve used is called the generating curve.

Definition: Quadric Surface

A **quadric surface** is the graph in space of a second-degree equation in x, y, and z. They can be expressed in the form

$$Ax^2 + By^2 + Cz^2 + Dxy + Exz + Fyz + Gx + Hy + Jz + K = 0$$

Shape	Formula	Image
Elliptical Paraboloid	$\frac{x^2}{a^2} + \frac{y^2}{b^2} = \frac{z}{c}$	
Ellipsoid	$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$	
Elliptical Cone	$\frac{x^2}{a^2} + \frac{y^2}{b^2} = \frac{z^2}{c^2}$	

Shape	Formula	Image
		
Hyperboloid of One Sheet	$\frac{x^2}{a^2} + \frac{y^2}{b^2} - \frac{z^2}{c^2} = 1$	
Hyperboloid of Two Sheets	$\frac{z^2}{c^2} - \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$	

Shape	Formula	Image
Hyperbolic Paraboloid	$\frac{y^2}{b^2} - \frac{x^2}{a^2} = \frac{z}{c}, c > 0$	

3D Interactive Example:

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

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

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

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

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

Hyperbolic Paraboloid: $\frac{y^2}{b^2} - \frac{x^2}{a^2} = \frac{z}{c}, c > 0$ >