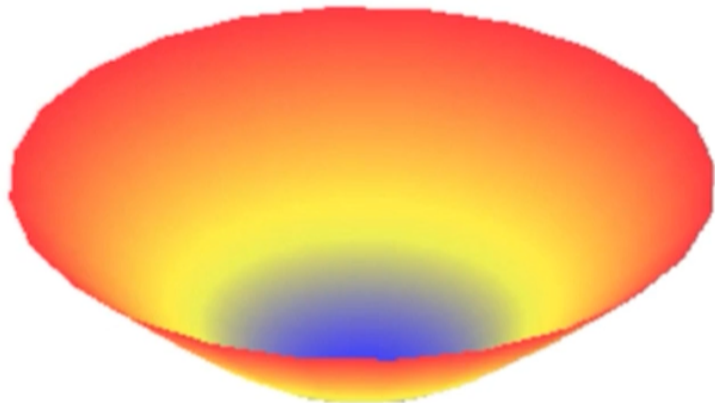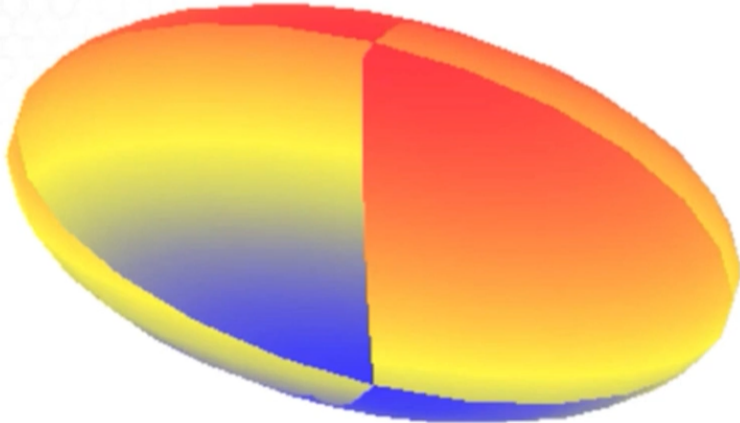# Quadric Surfaces

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.
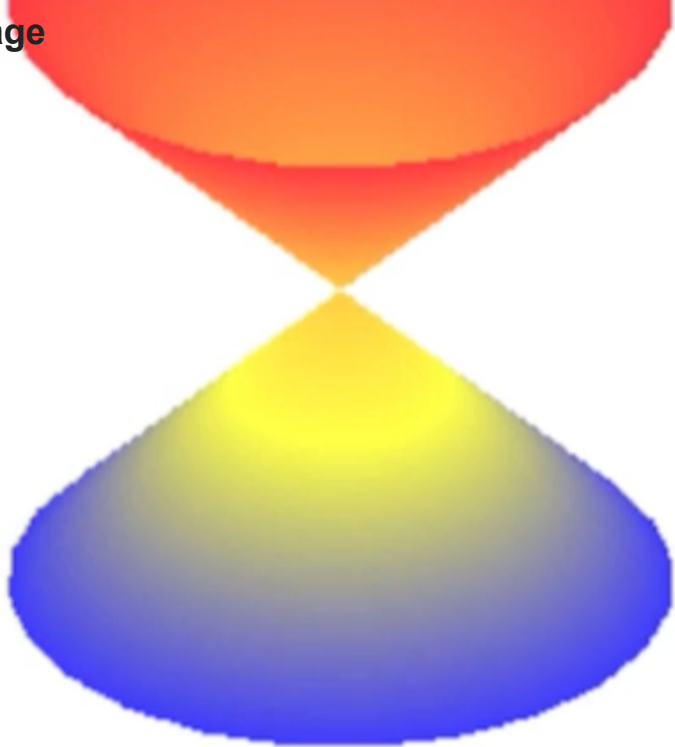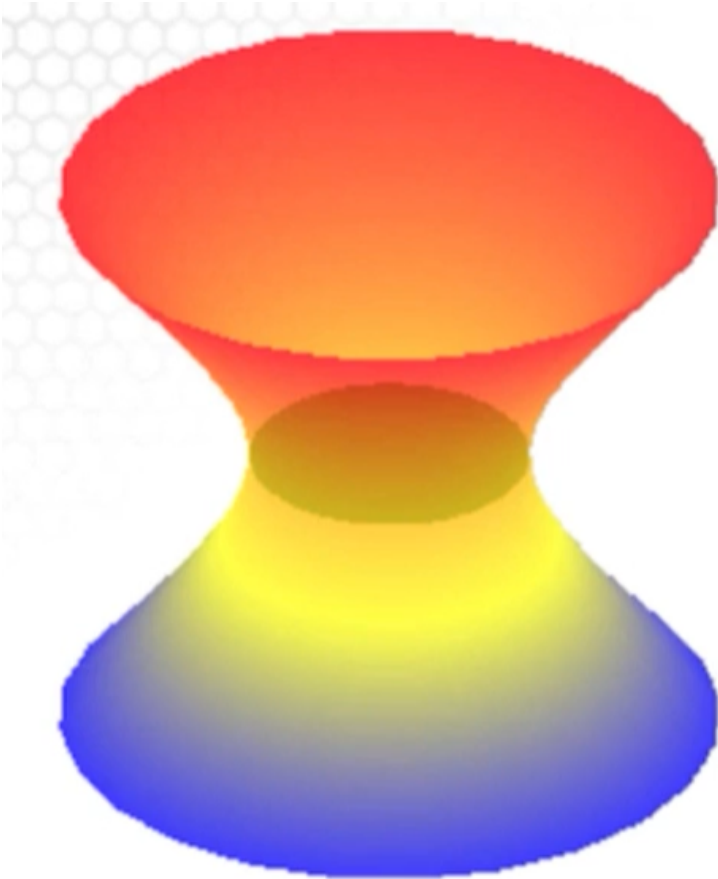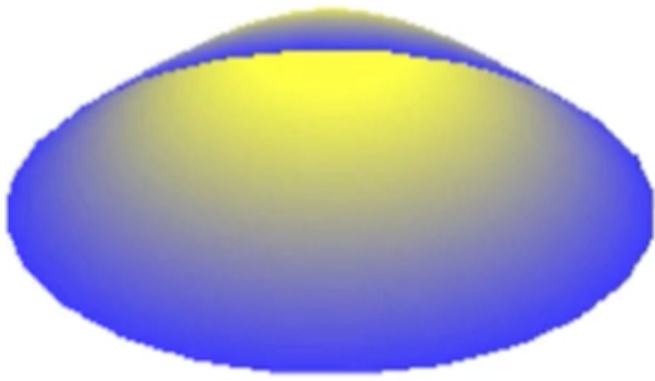
> **Definition: Quadric Surface**
>
> A **quadric surface** is the graph in space of a second-degree equation in x, y, and z. They can be expressed in the form
>
> $$Ax^2 + By^2 + Cz^2 + Dxy + Exz + Fyz + Gx + Hy + Jz + K = 0$$

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

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	$\dfrac{y^2}{b^2} - \dfrac{x^2}{a^2} = \dfrac{z}{c}, c > 0$	