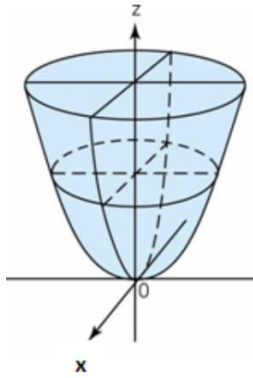


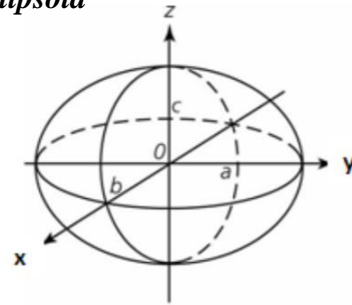
Section 12-3 Quadric Surfaces

A 3-dimensional generated by rotating a conic section around an axis is a **Quadric Surface**.

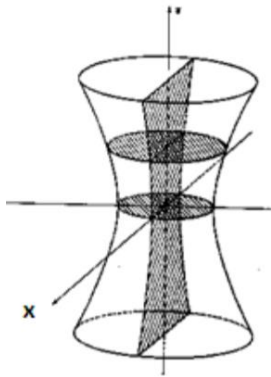
Paraboloid



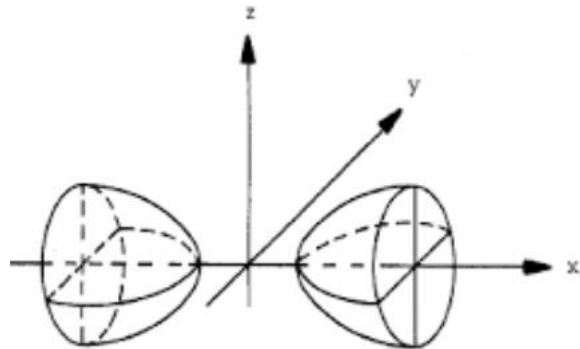
Ellipsoid



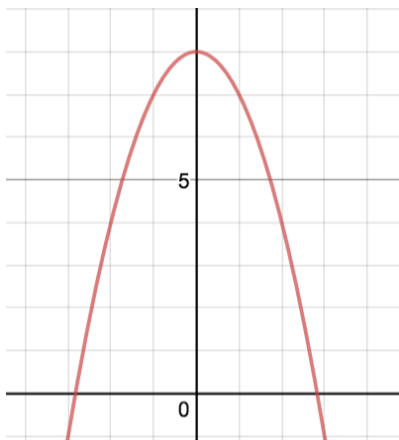
Hyperboloid of one sheet



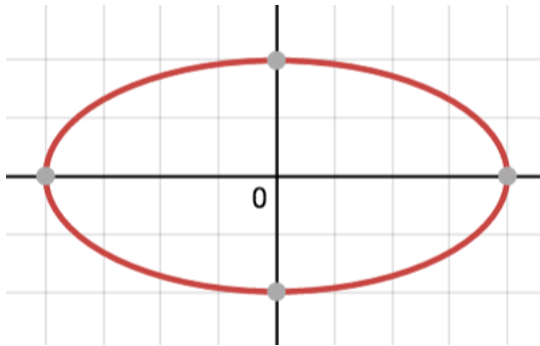
Hyperboloid of two sheets



1. Find the dimensions of the rectangle of largest area that has its base on the x-axis and its other two vertices above the x-axis and lying on the parabola $y = 8 - x^2$



2. An ellipsoid is formed by rotating ellipse $x^2 + 4y^2 = 16$ about the y-axis. A cylinder is inscribed in the ellipsoid with its axis along the y-axis and its two bases touching the ellipsoid. Find the radius and altitude of the cylinder with maximum volume.



Radius = _____

Altitude = _____

Max volume = _____

3. A circle $x^2 + y^2 = 25$ is rotated about the y-axis to form a sphere. A cylinder is inscribed in the sphere, with its axis along the y-axis. Write an equation expressing the volume of the cylinder in terms of a sample point (x, y) in the first quadrant. Find the value of x that gives the maximum volume.

