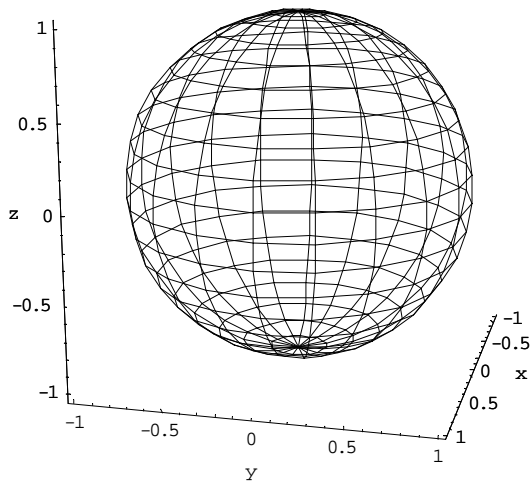


## QUADRIC SURFACES

Here are some drawings of quadric surfaces. Unless otherwise indicated, the y-axis runs left to right, the x-axis runs “out toward you”, and the z-axis runs up and down. Note that the scales do not lie on the axes, i.e. on the sphere the x,y,and z-axes run through the middle of the sphere although the scales are at the sides of the picture.

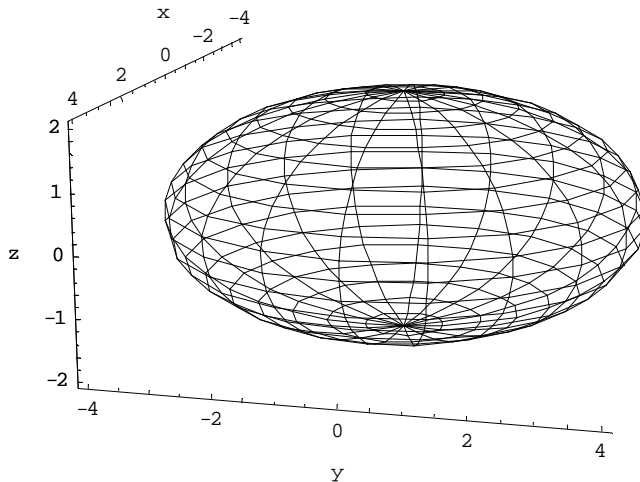
### Sphere

This is the sphere  $x^2 + y^2 + z^2 = 1$ , centered at the origin with radius 1.



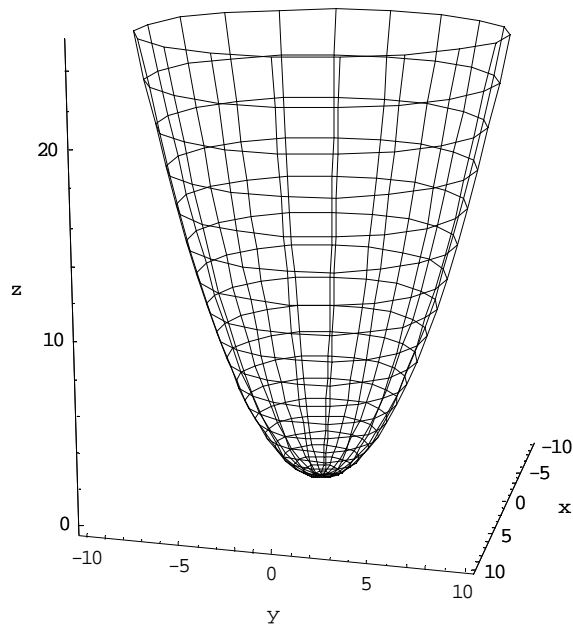
### Ellipsoid

This is the ellipsoid  $\frac{x^2}{4} + \frac{y^2}{16} + z^2 = 1$ . It is centered at (0,0,0) and extends out to the following points: along the x-axis, to (-2,0,0) and (2,0,0); along the y-axis, to (0,-4,0) and (0,4,0); and along the z-axis, to (0,0,-1) and (0,0,1).



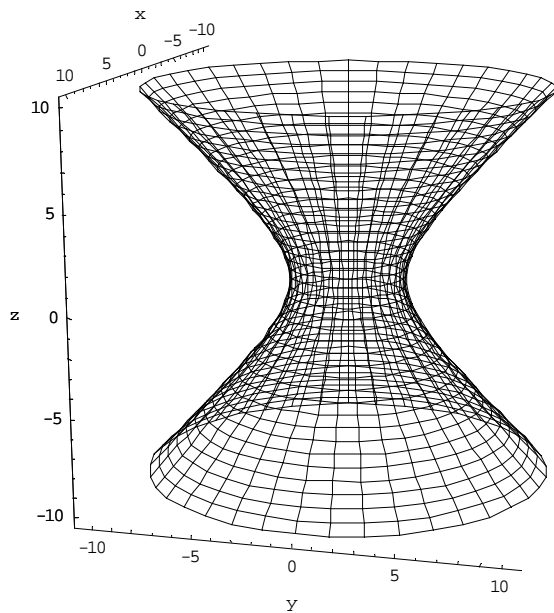
## Paraboloid

This is the paraboloid  $z = x^2 + y^2$ . The vertex is at the origin.



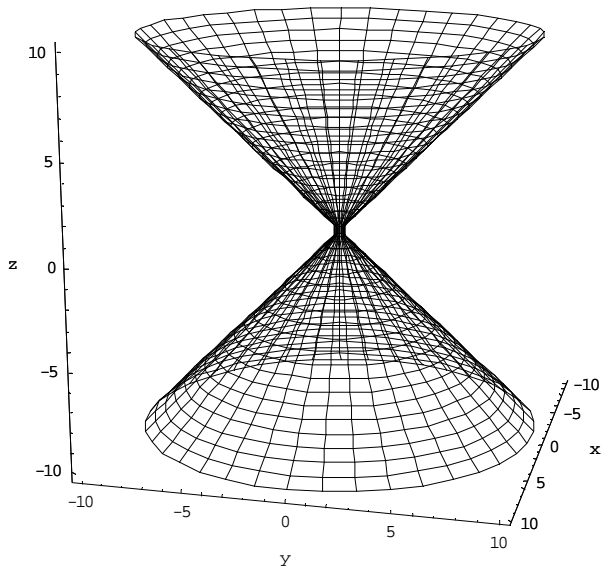
## Hyperboloid of one sheet

This is  $\frac{x^2}{16} + \frac{y^2}{16} - z^2 = 1$ .



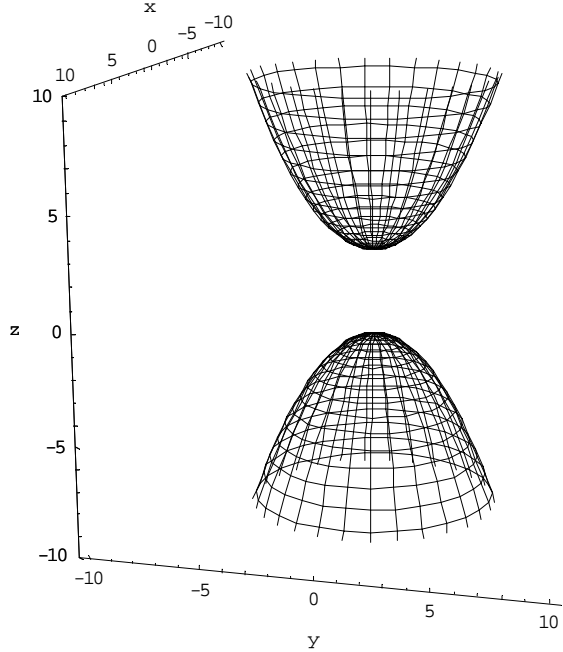
### Cone

This is  $x^2 + y^2 - z^2 = 0$ .



### Hyperboloid of two sheets

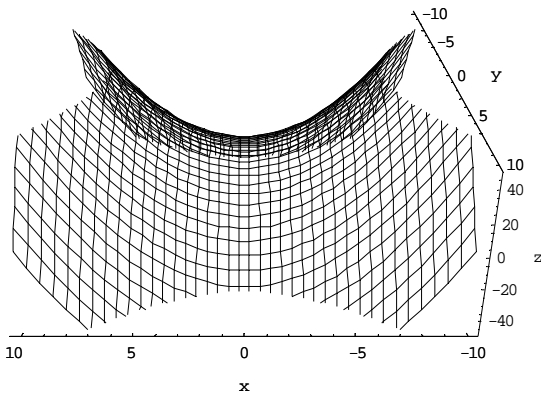
This is  $\frac{x^2}{16} + \frac{y^2}{16} - z^2 = -9$ . The two vertices are at  $(0,0,3)$  and  $(0,0,-3)$ .



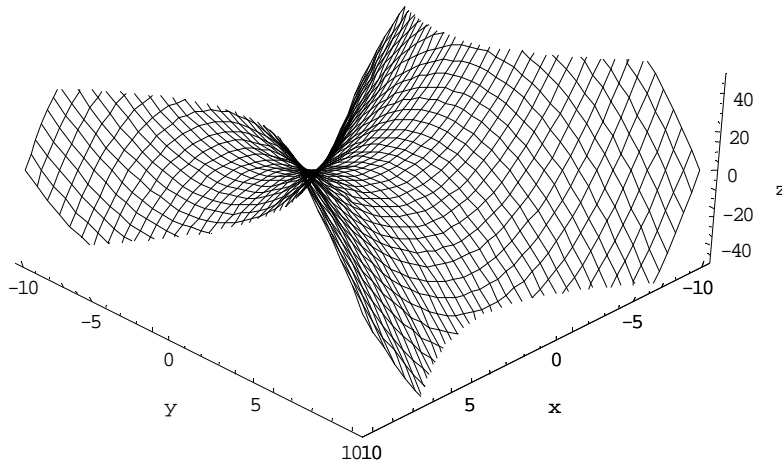
## Hyberbolic parabaloid

The next three drawings are all of  $z = x^2 - y^2$  from different perspectives:

1) Looking from the positive y-axis



2) Looking from the “usual” perspective



3) Looking from the positive x-axis

