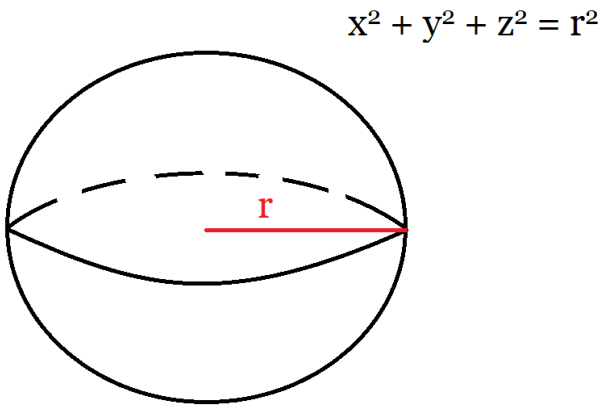
IMPORTANT SURFACES

1. Spherical Things

(1) Sphere of radius r

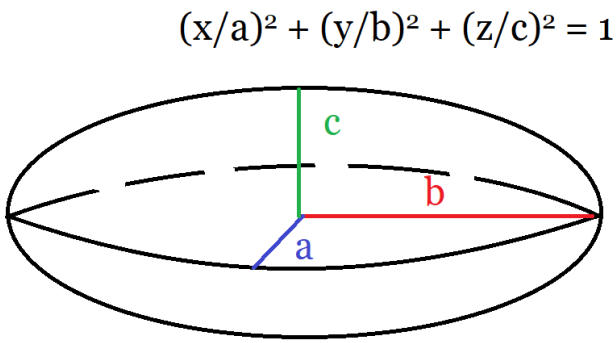
$$x^2 + y^2 + z^2 = r^2$$



(2) Ellipsoid

$$\left(\frac{x}{a}\right)^2 + \left(\frac{y}{b}\right)^2 + \left(\frac{z}{c}\right)^2 = 1$$

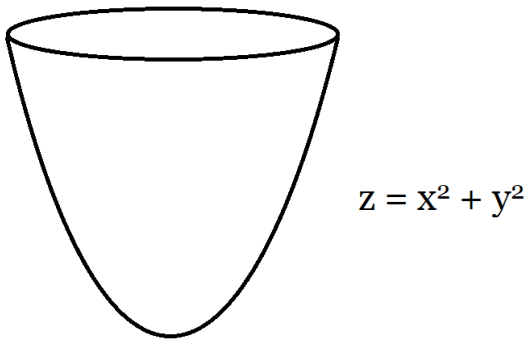
Date: Monday, January 6, 2020.



2. z equals to Stuff

(3) Paraboloid

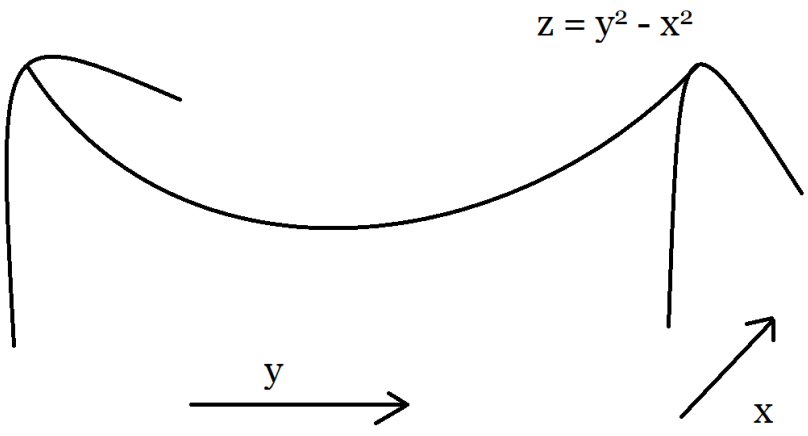
$$z = x^2 + y^2$$



(4) Saddle (Hyperbolic Paraboloid)

$$z = y^2 - x^2$$

(Curves up in the y direction and curves down in the x direction)

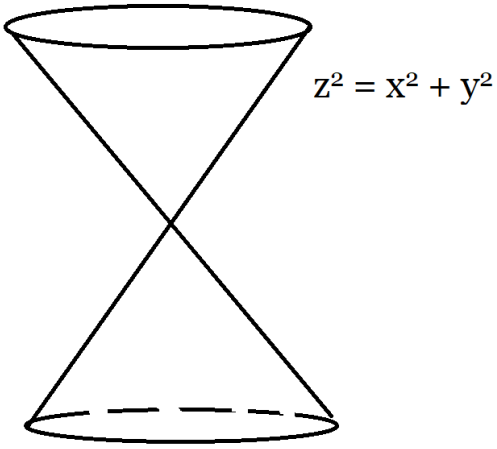


3. Cone

(5) Cone

$$z^2 = x^2 + y^2$$

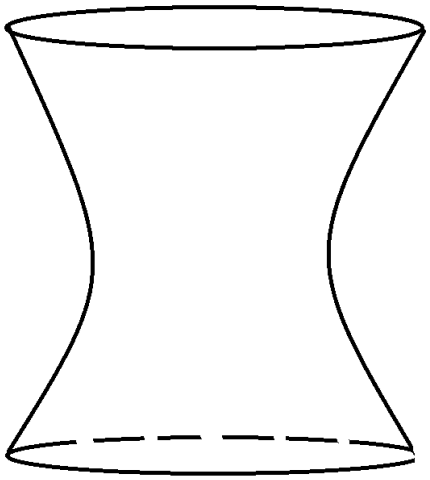
(Think radius $\sqrt{x^2 + y^2}$ is increasing)



4. One or two minuses

(6) Dress (Hyperboloid of one sheet, one minus)

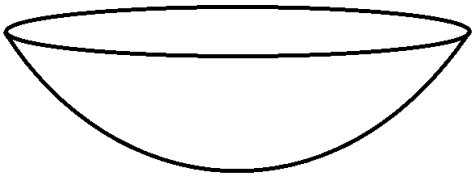
$$x^2 + y^2 - z^2 = 1$$



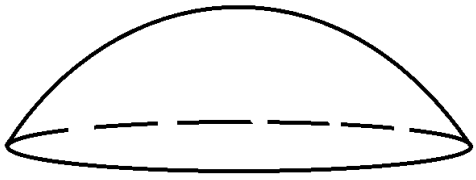
$x^2 + y^2 - z^2 = 1$

(7) Two cups (Hyperboloid of two sheets, two minuses)

$$-x^2-y^2+z^2=1$$



$-x^2 - y^2 + z^2 = 1$



5. Cylinders

Whenever a variable is missing, it's a cylinder
Example: $x^2+y^2=1$ in the xyz space. No z, so it's a cylinder in the z direction.