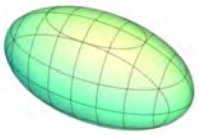
Most common quadrics (01.03.2023)

1.- Ellipsoid of semiaxis a, b, c:

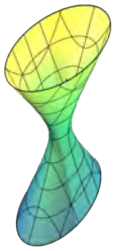
$$\boxed{\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}-1=0} \quad (a=b=c \Rightarrow \text{ sphere })$$



Intersections with planes perpendicular to the axes result in ellipses.

2.- Hyperboloid of one sheet:

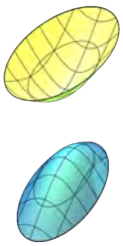
$$\boxed{\frac{x^2}{a^2}+\frac{y^2}{b^2}-\frac{z^2}{c^2}-1=0}$$



Intersections with planes $\perp OZ$ result in ellipses $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1+\frac{z^2}{c^2}=k$, $\forall z$

3.- Hyperboloid of two sheets:

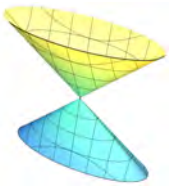
$$\boxed{\frac{x^2}{a^2}+\frac{y^2}{b^2}-\frac{z^2}{c^2}+1=0}$$



Intersections with planes $\perp OZ$ result in ellipses $\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{z^2}{c^2}-1=k$, $|z|\geq c$

4.- Elliptic cone:

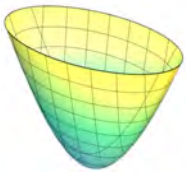
$$\boxed{\frac{x^2}{a^2}+\frac{y^2}{b^2}-\frac{z^2}{c^2}=0}$$



Intersections with planes $\perp OZ$ result in ellipses $\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{z^2}{c^2}=k$, $\forall z$

5.- Elliptic Paraboloid:

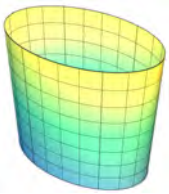
$$\boxed{\frac{x^2}{a^2}+\frac{y^2}{b^2}-2cz=0}$$



Intersections with planes $\perp OZ$ result in ellipses $\frac{x^2}{a^2}+\frac{y^2}{b^2}=2cz=k$; $\forall z \geqslant 0$

6.- Elliptic cylinder:

$$\boxed{\frac{x^2}{a^2}+\frac{y^2}{b^2}-1=0}$$



Intersections with planes $\perp OZ$ result in ellipses $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$; $\forall z$