

Answer on Question #67791 – Math – Analytic Geometry

Question

What surface is represented by $x^2 + y^2 = 9z$?

Give a rough sketch of it. Obtain the section of this surface by the plane $y = 0$.

Solution

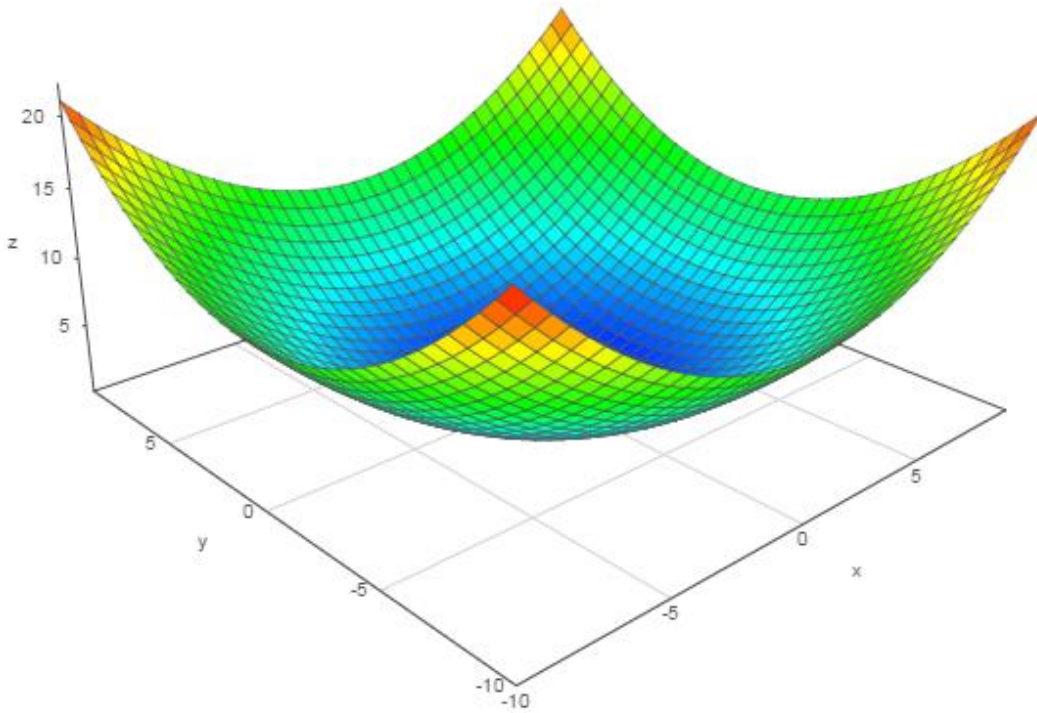
Elliptic paraboloid

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

We have that

$$\frac{x^2}{9} + \frac{y^2}{9} = z$$
$$c = 1, a^2 = b^2 = 9$$

Therefore, there is circular paraboloid.



The trace, or cross section, in the xy –plane is a point.

If $c = 1$, the point is the origin $(0, 0)$.

The traces in planes parallel to and above the xy –plane are circles.

The traces in the yz –plane and xz –plane are parabolas, as the traces are in planes parallel to these.

The cross section of the surface $x^2 + y^2 = 9z$ by the plane $y = 0$ is the parabola $z = \frac{x^2}{9}$ lying in the plane $y = 0$. It opens up.