

Unit 9: Parametrized surfaces

In order to study parametrized surfaces, it is helpful to look at **grid curves**. These are the curves obtained if one parameter is kept fixed. For a sphere, the **circles of latitudes** and **half circles of longitudes** are the grid curves. The **equator** is the circle of latitude of 0 which corresponds to $\phi = \pi/2$. The conversion is latitude = $\pi/2 - \phi$. The sphere is parametrized by

$$\vec{r}(u, v) = [\cos(u) \sin(v), \sin(u) \sin(v), \cos(v)] .$$

We analyze now the surface

$$\vec{r}(u, v) = [u \cos(v), u \sin(v), v] .$$

1 What are the grid curves where u is constant, like $u = 1$?

2 What are the grid curves where v is constant, like $v = 0$?

3 Can you draw the surface?

4 Let us change the parametrization to

$$\vec{r}(u, v) = [u \cos(v), u \sin(v), u] .$$

What surface is this now?