```
(* Define Stereographic projection from the north pole of S3, as well as its inverse*)
```

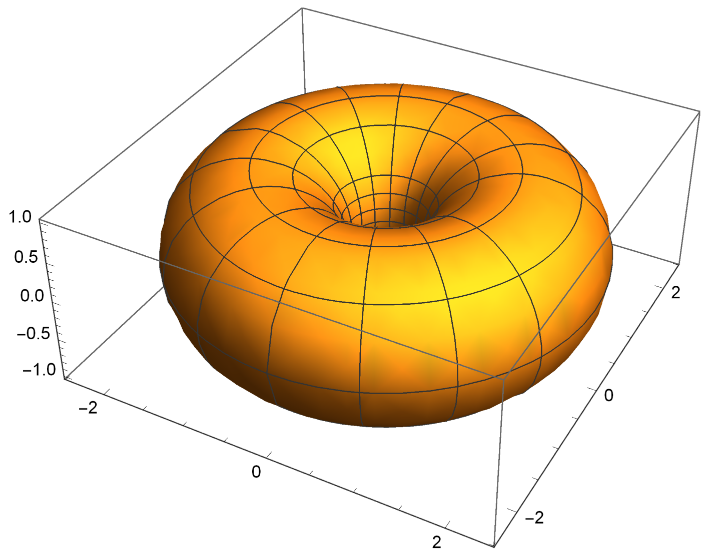
$$\text{StereoN}[x\_] := \left\{\frac{x[[1]]}{1-x[[4]]}, \frac{x[[2]]}{1-x[[4]]}, \frac{x[[3]]}{1-x[[4]]}\right\};$$

$$\text{IStereoN}[x\_] := \left\{2\,\frac{x[[1]]}{\text{Norm}[x]\hat{\ }2+1}, 2\,\frac{x[[2]]}{\text{Norm}[x]\hat{\ }2+1}, 2\,\frac{x[[3]]}{\text{Norm}[x]\hat{\ }2+1}, \frac{\text{Norm}[x]\hat{\ }2-1}{\text{Norm}[x]\hat{\ }2+1}\right\};$$

```
(*Here is our torus, stereographically projected from the north pole of S3*)
```

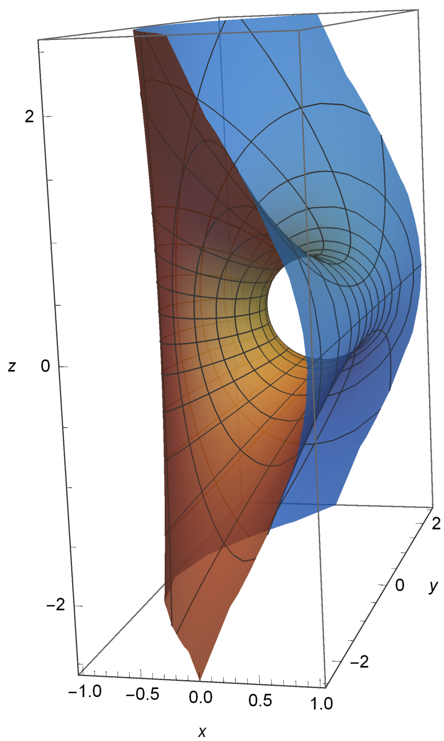
$$\text{tor}[th1\_, th2\_] := \left\{\frac{\text{Cos}[2\,\text{Pi}\,th1]}{\text{Sqrt}[2]}, \frac{\text{Sin}[2\,\text{Pi}\,th1]}{\text{Sqrt}[2]}, \frac{\text{Cos}[2\,\text{Pi}\,th2]}{\text{Sqrt}[2]}, \frac{\text{Sin}[2\,\text{Pi}\,th2]}{\text{Sqrt}[2]}\right\};$$

```
ParametricPlot3D[StereoN[tor[th1, th2]], {th1, 0, 1}, {th2, 0, 1}]
```




```
(* The point {1+Sqrt[2],0,0} is on the surface of this torus. I intend
 to do a stereographic projection from the corresponding point in S3*)

projpoint = IStereoN[{1 + Sqrt[2], 0, 0}];

(* Define rotation matrices for stereographic projections. R
 is a rotation matrix sending projpoint to the north pole of S3*)

Rot[th_] := {{Cos[th], 0, 0, -Sin[th]}, {0, 1, 0, 0}, {0, 0, 1, 0}, {Sin[th], 0, 0, Cos[th]}}
R = {Rot[Pi/2].projpoint, {0, 1, 0, 0}, {0, 0, 1, 0}, projpoint};

(* Plot the resulting projection of the torus*)
```

```
ParametricPlot3D[StereoN[R.tor[th1, th2]], {th1, 0, 1}, {th2, 0, 1}, PlotRange → Automatic,
 PlotStyle → {{Opacity[0.8], FaceForm[Hue[0.59, 0.73, 0.79], Hue[0.11, 0.73, 0.88]]}},
 AxesLabel → {x, y, z}]
```




```
(* This is a picture of the torus going through the point at infinity. The
 fourth order symmetry is a rotation Pi/2 radians CCW about the x axis,
followed by a reflection in the xy plane.
```