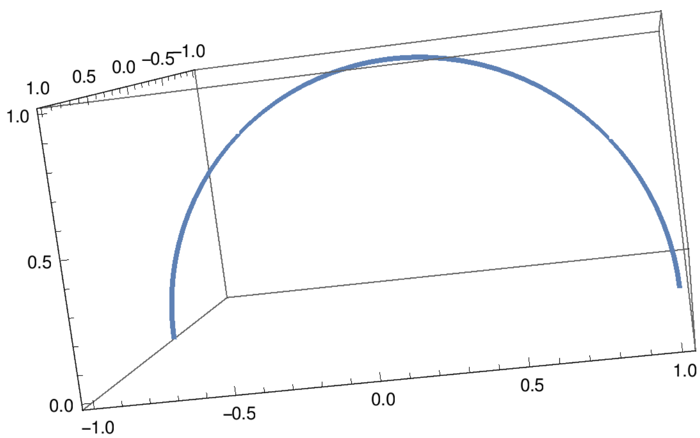
```
In[1069]:= ClearAll["Global`*"]

(* http://mini.pw.edu.pl/~porter/cc/psw/psw_cw1.pdf *)
(* Połowy łuku jednostkowego okregu *)
$density := 1;
$R := 1;

$x[r_, u_, v_] := r * Sin[v] Cos[u];
$y[r_, u_, v_] := r * Sin[v] Sin[u];
$z[r_, u_, v_] := r * Cos[v];
$v = π / 2;
$Body[r_, u_, v_] := {$x[r, u, v], $y[r, u, v], $z[r, u, v]};
ParametricPlot3D[$Body[$R, u, $v], {u, 0, π}]

$Integral[a_] := $density * ∫_0^π a ⅆu;

$Mass = $Integral[1];
$CenterOfMass := {$Integral[$x[$R, u, $v]],
    $Integral[$y[$R, u, $v]], $Integral[$z[$R, u, $v]]} / $Mass;

Print["Mass: ", $Mass]
Print["Center of Mass: ", MatrixForm[$CenterOfMass]]

$X := $x[$R, u, $v];
$Y := $y[$R, u, $v];
$Z := $z[$R, u, $v];
$I = {
   {$Integral[$Y^2 + $Z^2],
    -$Integral[$X * $Y],
    -$Integral[$X * $Z]},
   {-$Integral[$X * $Y],
    $Integral[$X^2 + $Z^2],
    -$Integral[$Y * $Z]},
   {-$Integral[$X * $Z ],
    -$Integral[$Y * $Z],
    $Integral[$Y^2 + $X^2]}};

$IPointFun[x_, y_, z_, m_] :=
  m * {
    {y^2 + z^2, -x * y, -x * z},
    {-x * y, x^2 + z^2, -y * z},
    {-x * z, -y * z, x^2 + y^2}};
$IPoint =
```

```
  $IPointFun[$CenterOfMass[[1]], $CenterOfMass[[2]], $CenterOfMass[[3]], $Mass];
$ICenter = $I - $IPoint;

Print["Tensor of Intertia around 0,0,0: ", MatrixForm[$I]]
Print["Tensor of Intertia around Point ", MatrixForm[$IPoint]]
Print["Tensor of Intertia around Center (Result): ", MatrixForm[$ICenter]]

$a = 2;
Show[ContourPlot3D[{{ix, iy, iz}.$ICenter.{ix, iy, iz} == 1},
  {ix, -$a, $a}, {iy, -$a, $a}, {iz, -$a, $a}]]
```

Out[1077]=



Mass: π

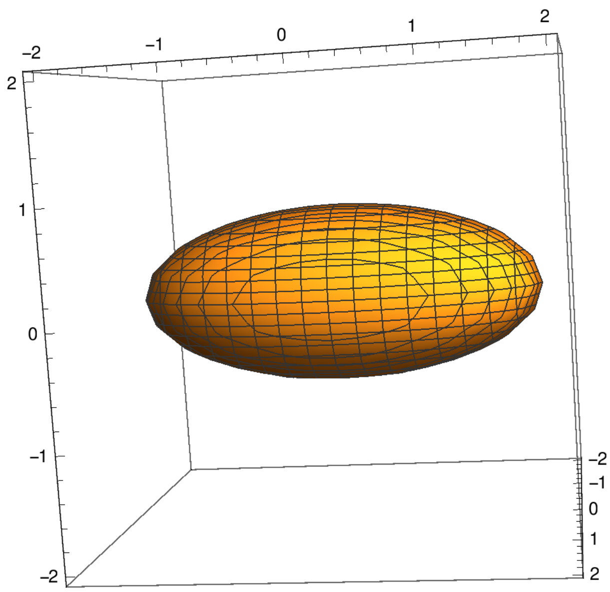
Center of Mass: $\begin{pmatrix} 0 \\ \frac{2}{\pi} \\ 0 \end{pmatrix}$

Tensor of Intertia around 0,0,0: $\begin{pmatrix} \frac{\pi}{2} & 0 & 0 \\ 0 & \frac{\pi}{2} & 0 \\ 0 & 0 & \pi \end{pmatrix}$

Tensor of Intertia around Point $\begin{pmatrix} \frac{4}{\pi} & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & \frac{4}{\pi} \end{pmatrix}$

Tensor of Intertia around Center (Result): $\begin{pmatrix} -\frac{4}{\pi}+\frac{\pi}{2} & 0 & 0 \\ 0 & \frac{\pi}{2} & 0 \\ 0 & 0 & -\frac{4}{\pi}+\pi \end{pmatrix}$

Out[1094]=



In[1095]:=