

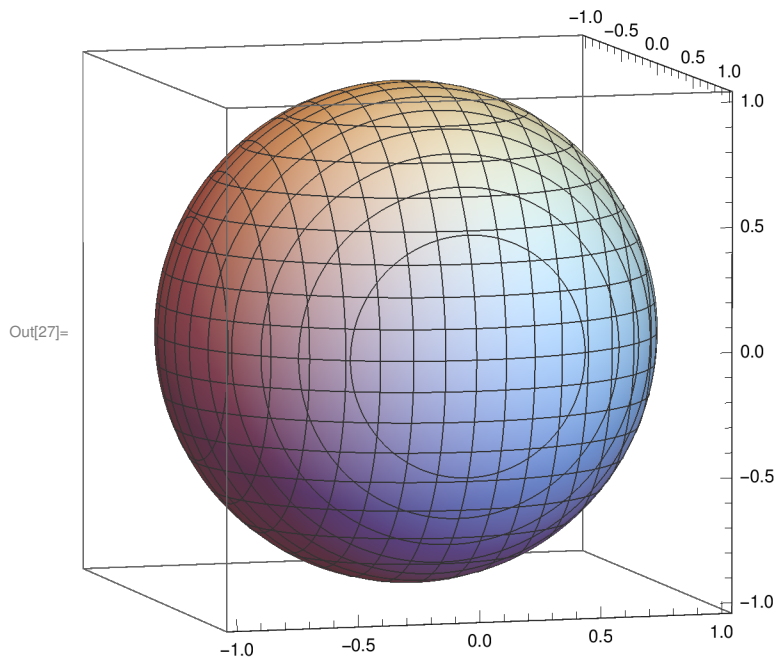
```
In[19]:= (*Looks at the Pauli Spin example, and verifies that the index is one
at the origin. *)
```

```
In[20]:= n = 1;
sigma1 = {{0, 1}, {1, 0}};
sigma2 = {{0, -I}, {I, 0}};
sigma3 = {{1, 0}, {0, -1}};
loclzr = KroneckerProduct[sigma1, n * sigma1 - x * IdentityMatrix[2]] +
KroneckerProduct[sigma2, sigma2 - y * IdentityMatrix[2]] +
KroneckerProduct[sigma3, n * sigma3 - z * IdentityMatrix[2]];
MatrixForm[loclzr]
charpoly = FullSimplify[Det[loclzr]]
pl = ContourPlot3D[charpoly == 0, {x, -1, 1}, {y, -1, 1}, {z, -1, 1},
Contours -> {{1, LightBlue}}, PlotPoints -> 100, ViewPoint -> {72, -21, 9}]
```

Out[25]/MatrixForm=

$$\begin{pmatrix} 1-z & 0 & -x+iy & 0 \\ 0 & -1-z & 2 & -x+iy \\ -x-iy & 2 & -1+z & 0 \\ 0 & -x-iy & 0 & 1+z \end{pmatrix}$$

Out[26]= $(-1 + x^2 + y^2 + z^2) (3 + x^2 + y^2 + z^2)$



```
In[28]:= Export["Lemniscate1.eps", pl, ImageSize -> 3.2 * 72]
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Out[28]= Lemniscate1.eps

```
In[29]:= A = ReplaceAll[loclzr, {x -> 0, y -> 0, z -> 0}]
```

Out[29]= {{1, 0, 0, 0}, {0, -1, 2, 0}, {0, 2, -1, 0}, {0, 0, 0, 1}}

```
In[30]:= MatrixForm[A]
```

```
Out[30]//MatrixForm=
```

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 2 & 0 \\ 0 & 2 & -1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

```
In[31]:= Eigenvalues[A]
```

```
Out[31]= { -3, 1, 1, 1 }
```