```
(* Coordinate System *)
(* Load the package *)
<< VectorAnalysis`
CoordinateSystem
(* Check default coordinate System *)
```
Out[●]= Cartesian

```
Coordinates[]
(* Check Cordinates Variables *)
```
Out[●]= {Xx, Yy, Zz}

In[●]:= ? SetCoordinates

Symbol	ⓘ

SetCoordinates[*coordsys*] sets the default coordinate system to be *coordsys* with default variables.

SetCoordinates[*coordsys*[c_1, c_2, c_3]] sets the default coordinate system to be *coordsys* with variables c_1, c_2, and c_3.

⌄

```
(* Change names of Coordinates Variables & Coordinates *)
SetCoordinates[Cartesian[r, th, phi]]
```

Out[●]= Cartesian[r, th, phi]

In[●]:= Coordinates[]
Out[●]= {r, th, phi}

In[●]:= SetCoordinates[Spherical[r, th, phi]]

Out[●]= Spherical[r, th, phi]

In[●]:= CoordinateSystem
Out[●]= Spherical

In[●]:= Coordinates[]
Out[●]= {r, th, phi}

```
(* Now by defauld coordinate system is Spherical *)
```

In[●]:= CoordinatesFromCartesian[{x, y, z}]

Out[●]= $\left\{ \sqrt{x^2 + y^2 + z^2}, \text{ArcCos}\left[\dfrac{z}{\sqrt{x^2 + y^2 + z^2}} \right], \text{ArcTan}[x, y] \right\}$

In[●]:= CoordinatesFromCartesian[{7/2, 7 Sqrt[3]/2, 5}, Cylindrical]

Out[●]= $\left\{ 7, \dfrac{\pi}{3}, 5 \right\}$

In[ ]:= **SetCoordinates[Cylindrical[r, th, z]]**

Out[ ]= Cylindrical[r, th, z]

In[ ]:= **CoordinatesFromCartesian[{x, y, z}]**

Out[ ]= $\left\{ \sqrt{x^2 + y^2} \ , \text{ArcTan}[x, y], z \right\}$

In[ ]:= **CoordinatesToCartesian[{x, y, z}, Spherical]**

Out[ ]= {x Cos[z] Sin[y], x Sin[y] Sin[z], x Cos[y]}

In[ ]:= **CoordinatesToCartesian$\left[\{7, \text{Pi} / 3, 5\}, \text{Cylindrical}\right]$**

Out[ ]= $\left\{ \dfrac{7}{2}, \dfrac{7\sqrt{3}}{2}, 5 \right\}$

```
(* Spherical To/From Cylinderical User Defined Function *)
SphericalToCylindrical[r_, th_, phi_] :=
   CoordinatesFromCartesian[CoordinatesToCartesian[{r, th, phi}, Spherical], Cylindrical];
SphericalToCylindrical[0.2, Pi / 5, 2 Pi / 7]
```

Out[ ]= {0.117557, 0.897598, 0.161803}

In[ ]:= **SphericalFromCylindrical[r_, th_, z_] :=**
   CoordinatesFromCartesian[CoordinatesToCartesian[{r, th, z}, Cylindrical], Spherical];
   SphericalFromCylindrical[0.11755705045849461`, 0.8975979010256553`, 0.1618033988749895`]

Out[ ]= {0.2, 0.628319, 0.897598}

In[ ]:= **CylindericalToSpherical[r_, th_, z_] :=**
   CoordinatesFromCartesian[CoordinatesToCartesian[{r, th, z}, Cylindrical], Spherical];
   CylindericalToSpherical[0.11755705045849461`, 0.8975979010256553`, 0.1618033988749895`]

Out[ ]= {0.2, 0.628319, 0.897598}

In[ ]:= **CylindericalFromSpherical[r_, th_, phi_] :=**
   CoordinatesFromCartesian[CoordinatesToCartesian[{r, th, phi}, Spherical], Cylindrical];
   SphericalToCylindrical$\left[0.2, \text{Pi} / 5, 2 \text{Pi} / 7\right]$

Out[ ]= {0.117557, 0.897598, 0.161803}