1. Cylindrical 

\((r, \theta, z)\)

Conversion: \(X = r \cos \theta\)  
\(Y = r \sin \theta\)  
\(Z = z\)

\(r = \sqrt{x^2 + y^2}\)  
\(\theta = \tan^{-1}\left(\frac{y}{x}\right)\)  
(careful to check quadrant)
Spherical \((\rho, \theta, \phi)\)  

- \(\rho\): radius from \(z\)-axis  
- \(\theta\): angle around \(z\)-axis  
- \(\phi\): angle down from \(z\)-axis  

\(0 \leq \phi \leq \pi\)

Conversions:

\[
\begin{align*}
x &= \rho \sin \phi \cos \theta \\
y &= \rho \sin \phi \sin \theta \\
z &= \rho \cos \phi
\end{align*}
\]

Other way:

\[
\begin{align*}
\rho &= \sqrt{x^2 + y^2 + z^2} \\
\phi &= \cos^{-1} \left( \frac{z}{\sqrt{x^2 + y^2 + z^2}} \right) \\
\theta &= \tan^{-1} \left( \frac{y}{x} \right)
\end{align*}
\]

(careful of quadrant.)
Cylindrical \[(c \text{ is constant})\]

\[r = c\]
\[z = c\]

cylinder w/ radius \(c\)
plane at height \(c\)