Cylindrical Coordinates

- $x = r \cos \theta$

- $y = r \sin \theta$

- $z = z$

- To change an integral into cylindrical coordinates:

$$\iiint_E f(x,y,z)dxdydz = \iiint_{\widetilde{E}} f(r\cos\theta, r\sin\theta, z)\, r\, dr\, d\theta\, dz$$

Spherical Coordinates

- $x = \rho \sin \phi \cos \theta$

- $y = \rho \sin \phi \sin \theta$

- $z = \rho \cos \phi$

- To change an integral into spherical coordinates:

$$\iiint_E f(x,y,z)dxdydz = \iiint_{\widetilde{E}} f(\rho\sin\phi\cos\theta, \rho\sin\phi\sin\theta, \rho\cos\phi)\, \rho^2 \sin\phi\, d\rho\, d\phi\, d\theta$$