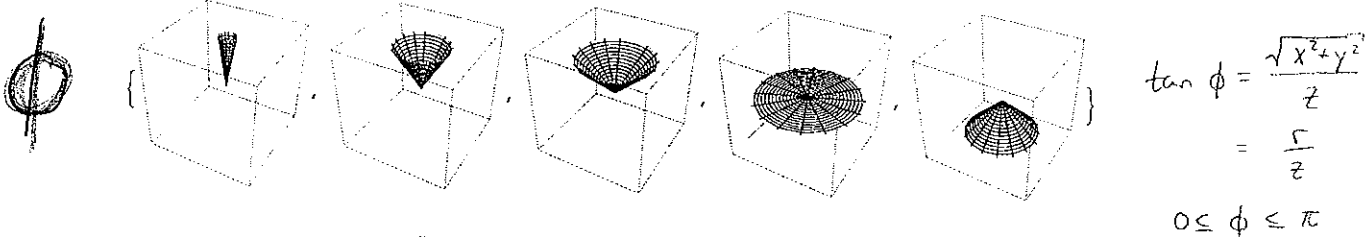
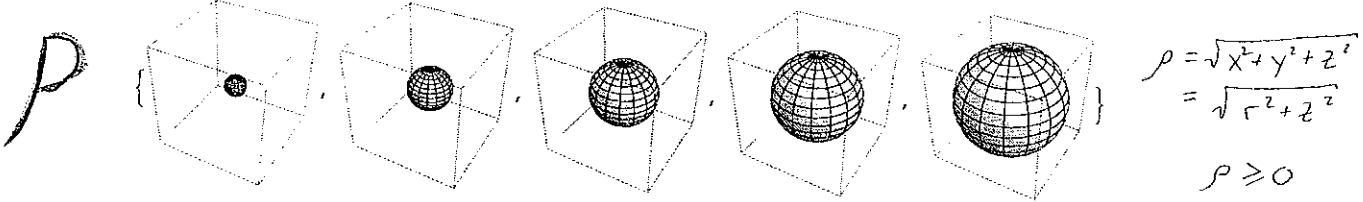
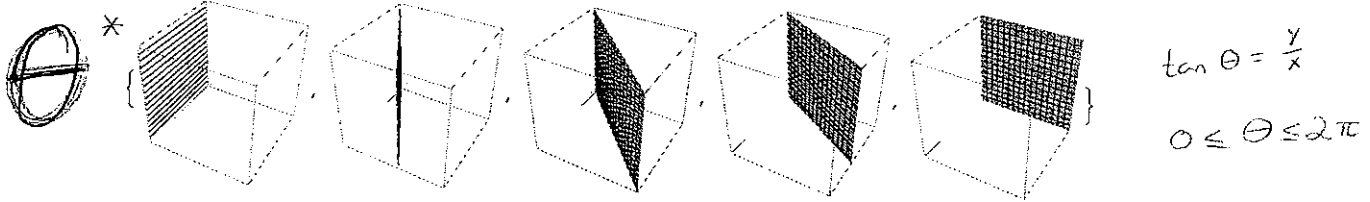
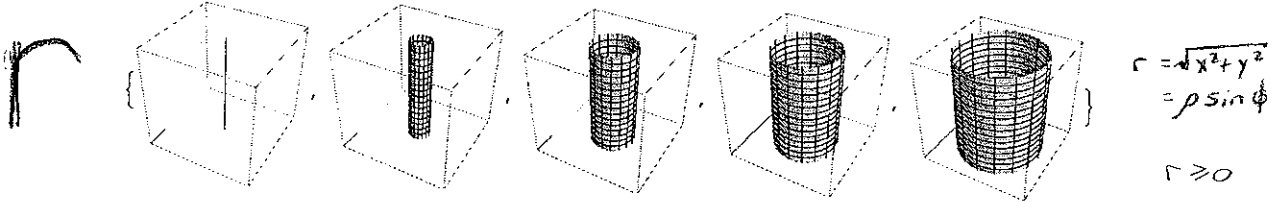
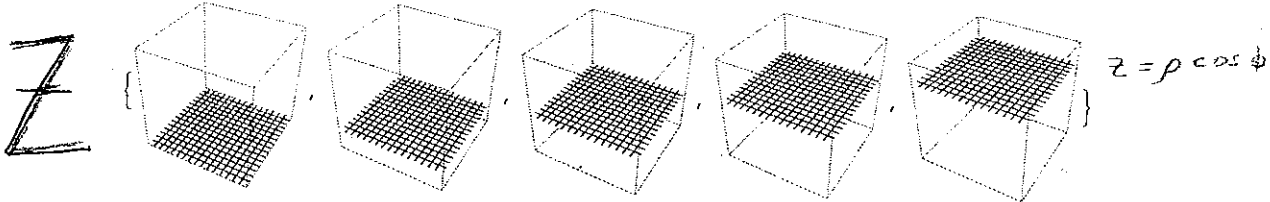
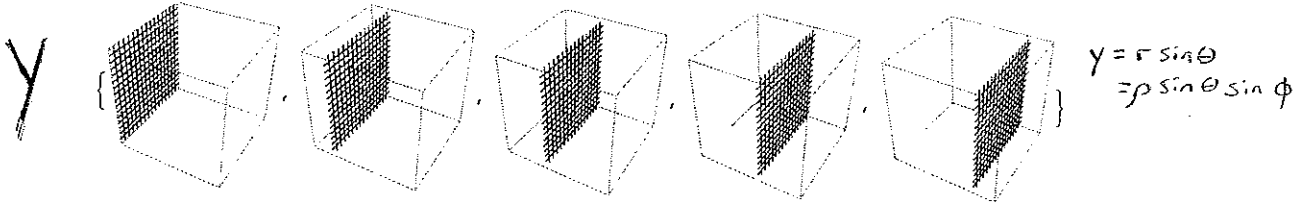
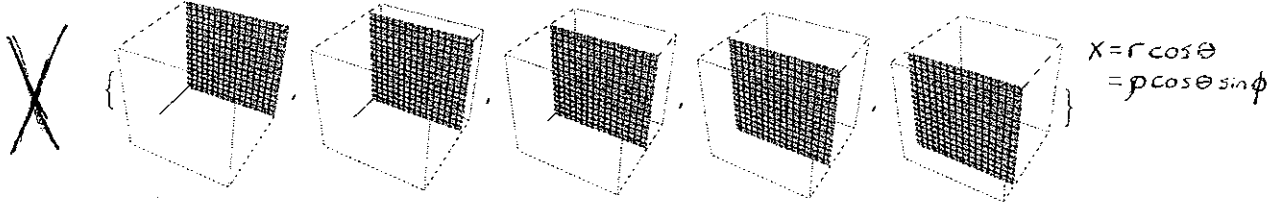


Summary of 3D Coordinates



rectangular
(x, y, z)

cylindrical
(r, θ , z)

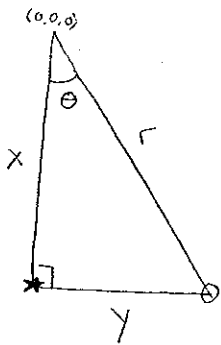
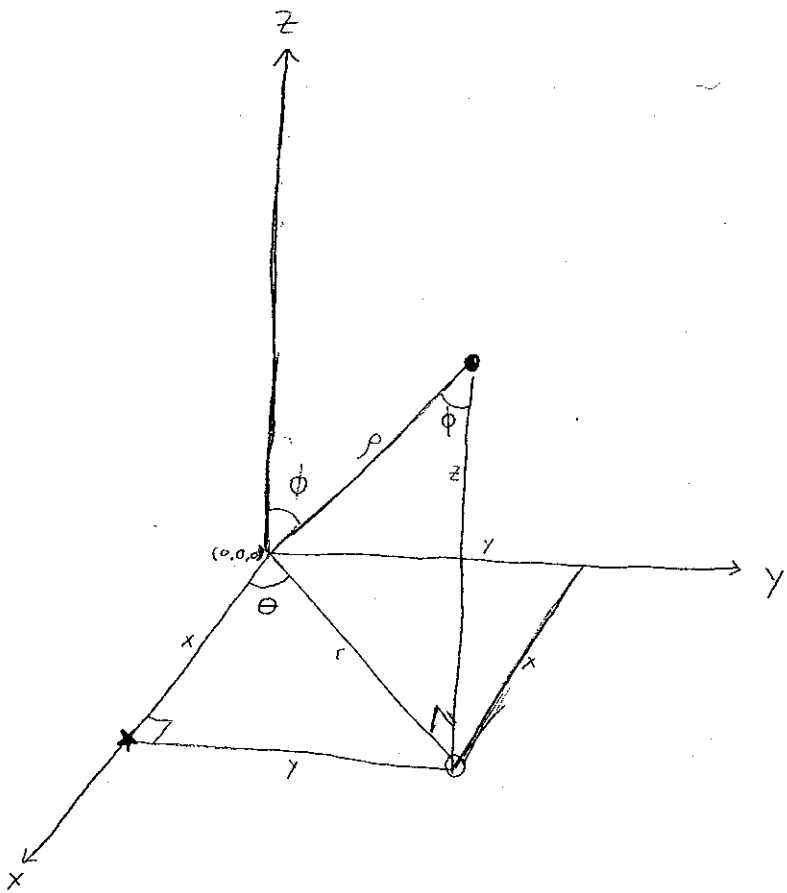
spherical
(ρ , θ , ϕ)

$$dV = dz dy dx$$

$$dV = r dz dr d\theta$$

$$dV = \rho^2 \sin \phi d\rho d\phi d\theta$$

* The pictures for θ have the origin in the back corner all other pictures have the origin in the center.

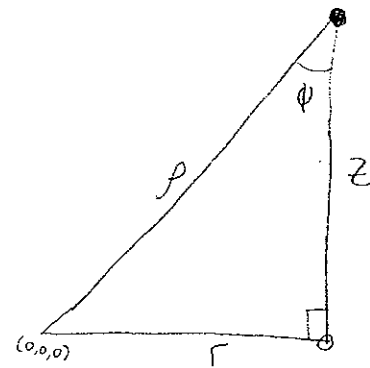


$$x = r \cos \theta$$

$$y = r \sin \theta$$

$$x^2 + y^2 = r^2$$

$$\frac{y}{x} = \tan \theta$$



$$z = \rho \cos \phi$$

$$r = \rho \sin \phi$$

$$z^2 + r^2 = \rho^2$$

$$\frac{r}{z} = \tan \phi$$