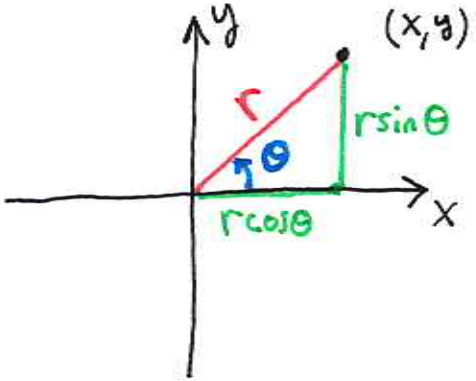
CURVELINEAR COORDINATES



$$r = \sqrt{x^2 + y^2}$$

$$x = r\cos\theta$$

$$y = r\sin\theta$$

$$\tan\theta = \frac{y}{x}, \quad x \neq 0$$

E1 $x^2 + y^2 = R^2 \quad (R > 0)$

$$r^2 = R^2$$

$$\boxed{r = R}$$

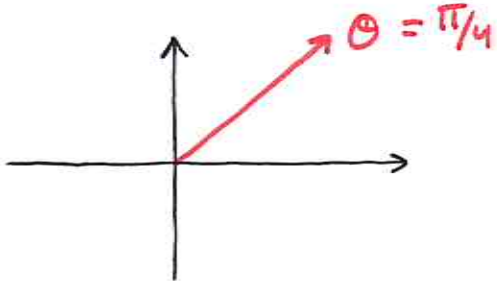
E2 $y = mx + b$

$$r\sin\theta = mr\cos\theta + b$$

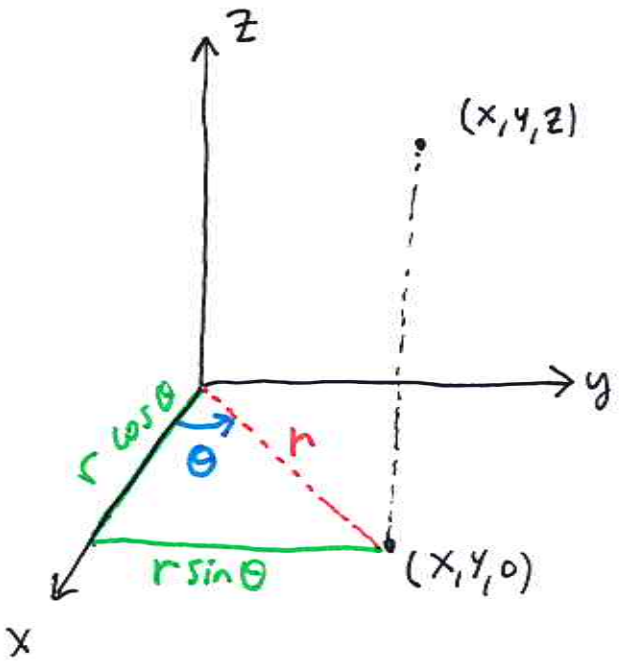
$$r(\sin\theta - m\cos\theta) = b$$

$$\boxed{r = \frac{b}{\sin\theta - m\cos\theta}}$$

E3 $\theta = \pi/4$



Cylindrical Coordinates ~ Polar Coordinates & z

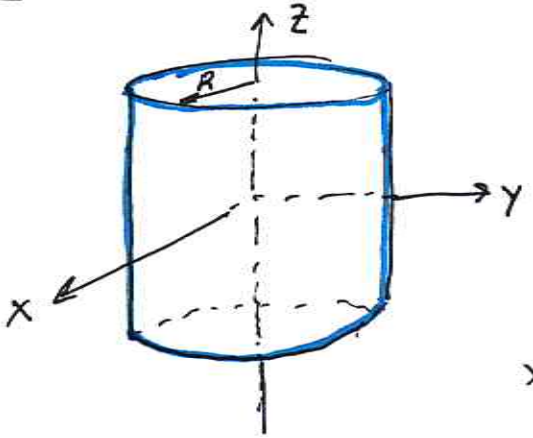


$$r = \sqrt{x^2+y^2}$$

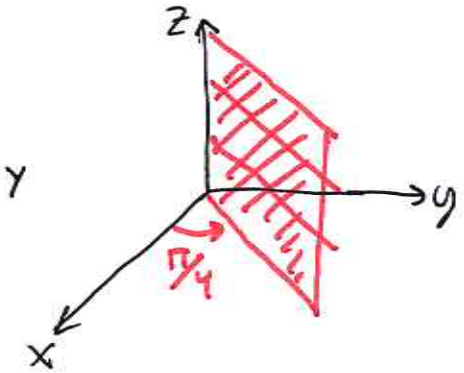
$$x = r\cos\theta$$
$$y = r\sin\theta$$
$$z = z$$

Cylindrical Coord.
$0 \le \theta \le 2\pi$

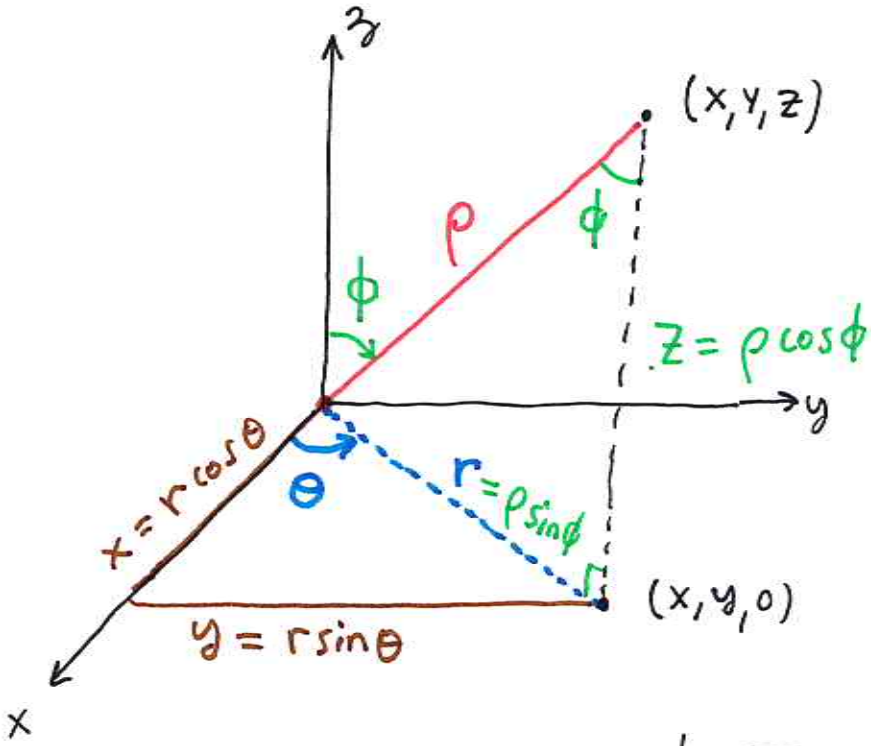
E1 $r = R$



E2 $\theta = \pi/4$



SPHERICAL COORDINATES



$$\rho = \sqrt{x^2+y^2+z^2}$$

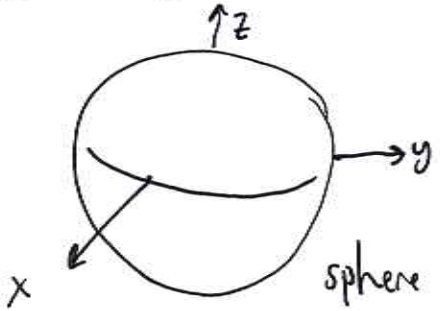
$$r = \rho \sin\phi$$

$$\begin{aligned} x &= \rho\cos\theta\sin\phi \\ y &= \rho\sin\theta\sin\phi \\ z &= \rho\cos\phi \end{aligned}$$

$0 \le \theta \le 2\pi$

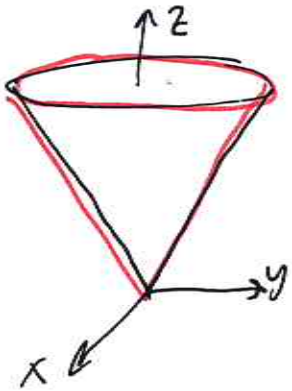
$0 \le \phi \le \pi$

E1 $\rho = R$

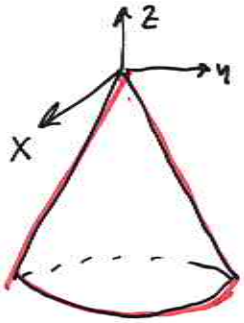


$$x^2+y^2+z^2 = R^2$$

E2 $\phi = \pi/4$



E3 $\phi = \frac{3\pi}{4}$



E4 $\phi = \pi/2$

$z = 0$

This is xy-plane