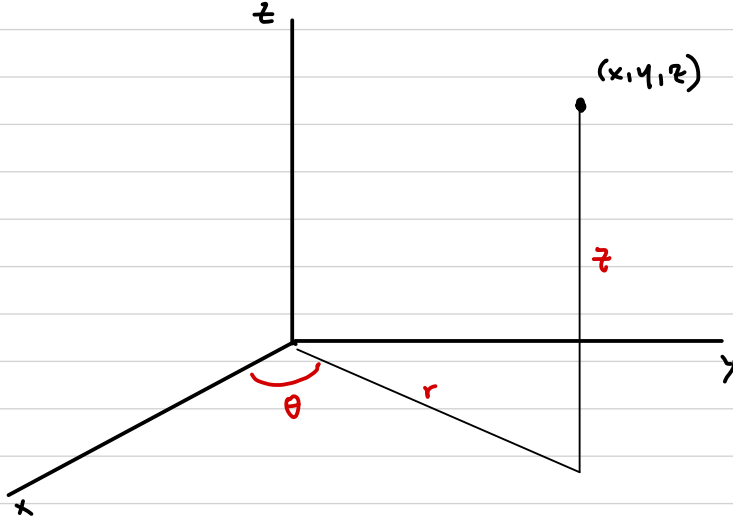


Cylindrical Coordinates (r, θ, z)



often restrict $r \geq 0$ and $0 \leq \theta < 2\pi$ so points

(other than z -axis) have unique (r, θ, z) coordinates.

Change of coordinates:

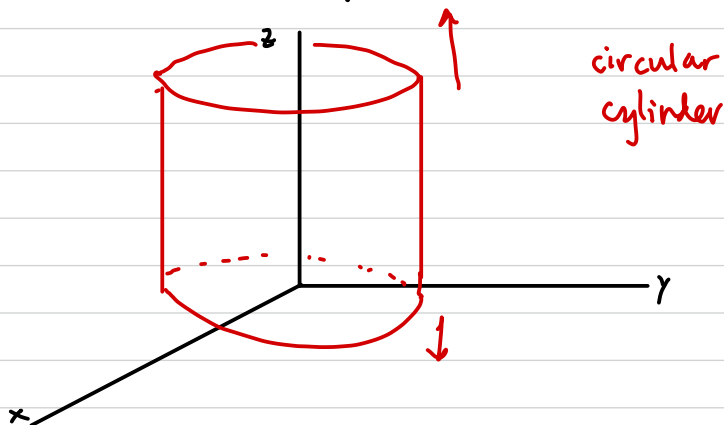
$$x = r \cos \theta$$

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

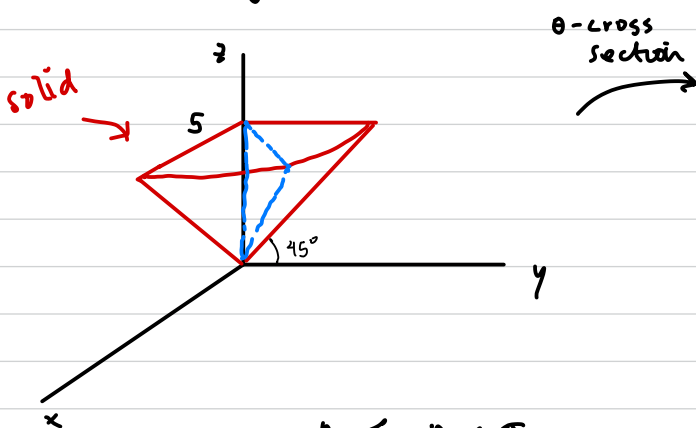
$$y = r \sin \theta$$

$$z = z$$

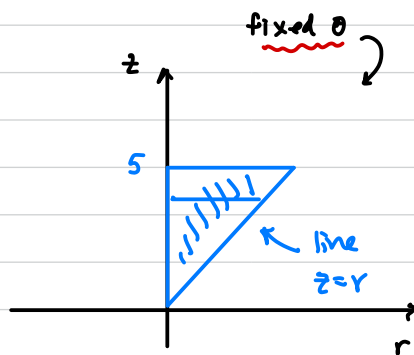
Ex What surface does eqn, $r=5$ describe?



Ex Describe a solid $\frac{1}{4}$ cone, angle 45° , of height 5 using cylindrical coordinates.



θ -cross section



Note: range of r depends on z

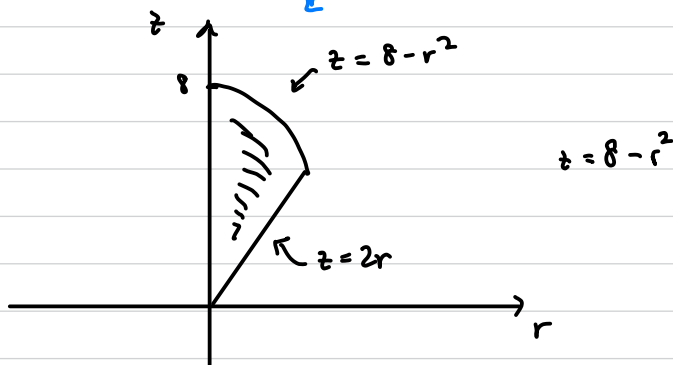
$$0 \leq \theta \leq \frac{\pi}{2}$$

$$0 \leq z \leq 5$$

$$0 \leq r \leq z$$

Ex. Sketch $2r \leq z \leq 8 - r^2$ in $\mathbb{R}^3$.

↳ trick: θ doesn't appear here.
Draw a θ -cross section...



Now spin: no restriction on θ .

