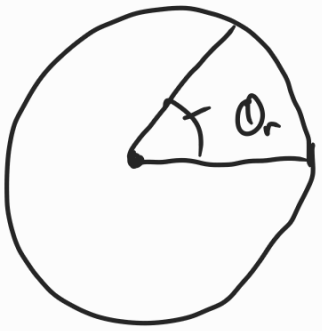
Relations over Formulas!

Remember: Class is for 2nd look! Confusing if you haven't worked first

- Converting degrees $\leftrightarrow$ rads

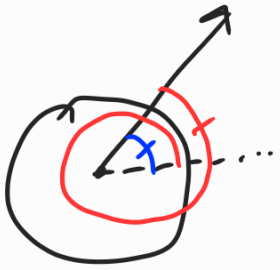
$$\frac{\theta_d}{360} = \frac{\theta_r}{2\pi}.$$



- Coterminal angles

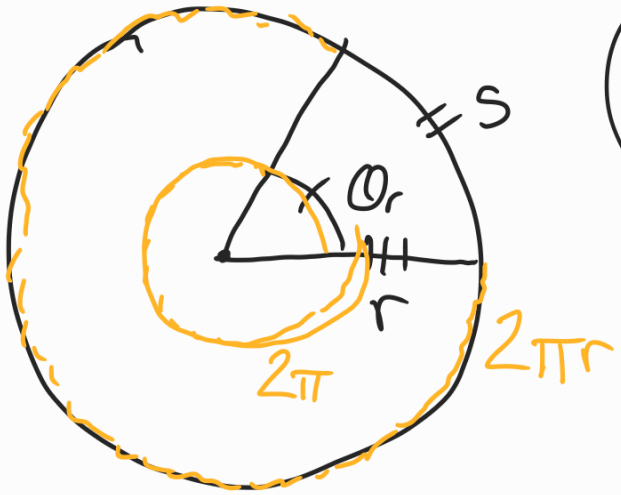
$$\theta_r = \theta_r + 2k\pi$$

$$\forall k \in \mathbb{Z}.$$



- Relating angle and arc length

$$\frac{\theta_r}{2\pi} = \frac{s}{2\pi r}$$



Common mistake: using θ_d

everything

- Areas of Sectors

$$\frac{\theta_r}{2\pi} = \frac{A(\theta_r, r)}{A(2\pi, r)}$$

$A(2\pi, r)$ = Area of circle of radius r

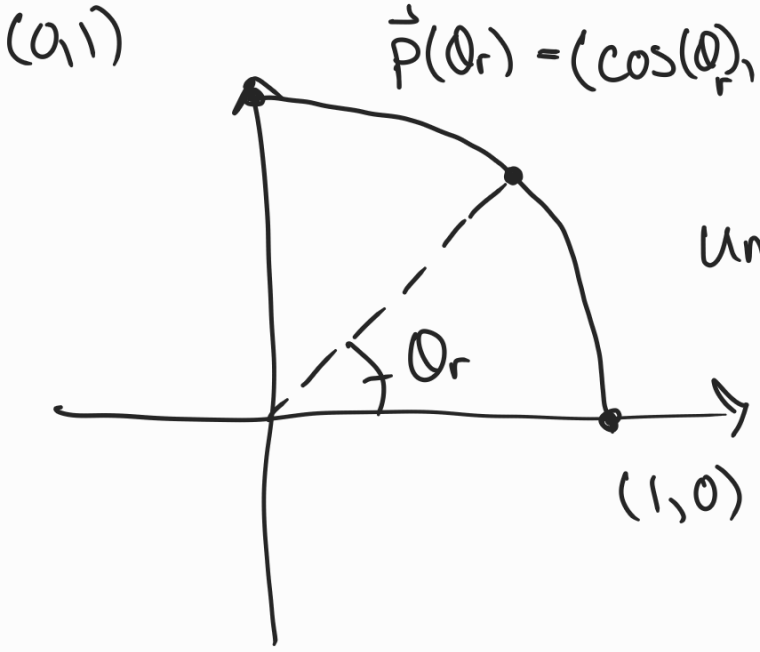
Review

$= \pi r^2$

$\Rightarrow \frac{\theta_r}{2\pi} = \frac{A(\theta_r, r)}{\pi r^2}$

Common Mistake:
Draw a picture!

- Trigonometry



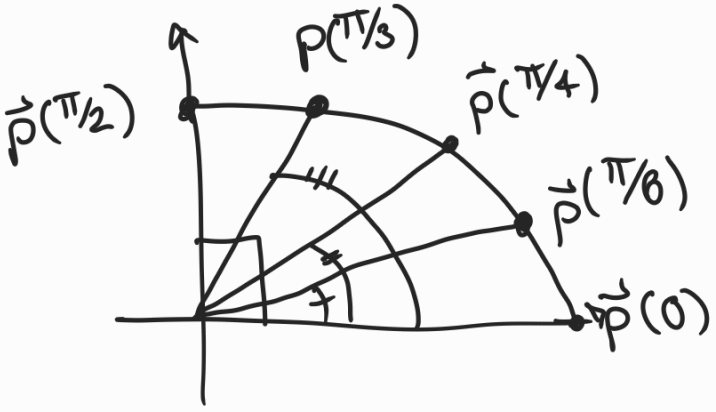
Unit circle

Example

Reflect!

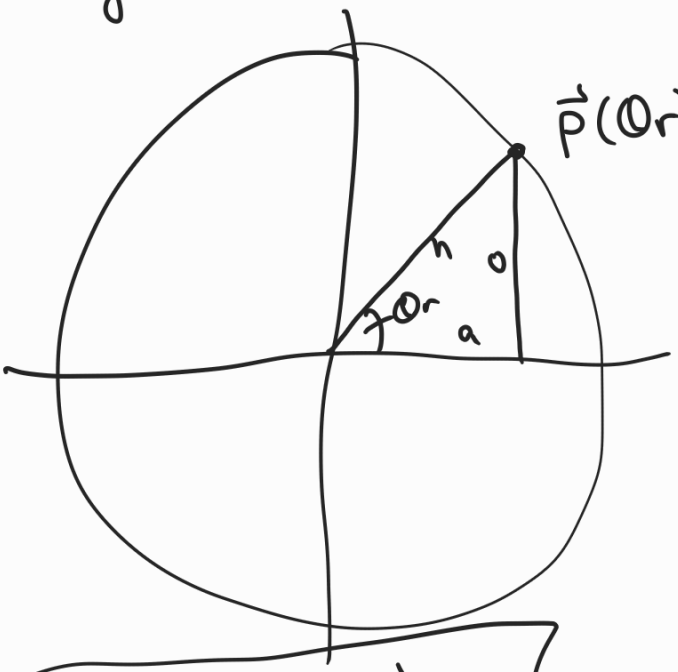
$0, \frac{2\pi}{12}, \frac{3\pi}{12}, \frac{4\pi}{12}, \frac{6\pi}{12}$

- Special angles



θ (trig)	$\sin(\theta)$ ↑	$\cos(\theta)$ ↓
0	$\sqrt{0/4}$	$\sqrt{4/4}$
$\pi/6$	$\sqrt{1/4}$	$\sqrt{3/4}$
$\pi/4$	$\sqrt{2/4}$	$\sqrt{2/4}$
$\pi/3$	$\sqrt{3/4}$	$\sqrt{1/4}$
$\pi/2$	$\sqrt{4/4}$	$\sqrt{0/4}$

- Trig functions as ratios



soh cho
cah sha
toa cao

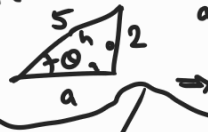
Thus

radius doesn't matter here

Common mistake:

$\sin^{-1}(\theta_r) \neq \frac{1}{\sin(\theta_r)}$

Calc ex:
$\sin(\theta) = 2/5$, $\cos(\theta)^2 = ?$

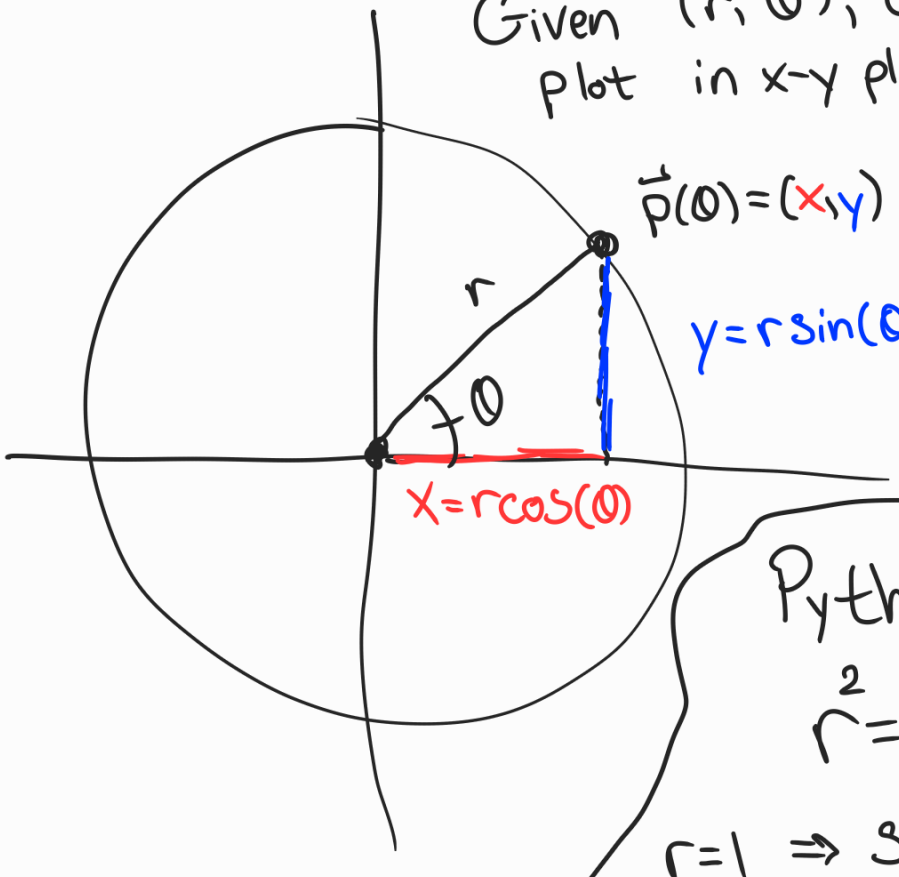


$a^2+4=25$
$a=\sqrt{21}$
$\Rightarrow \cos(\theta)^2 = (\frac{\sqrt{21}}{5})^2$.

Generalize Triangles: Vectors!

- Polar Coordinates / Vectors

Given (r, θ), can plot in x-y plane



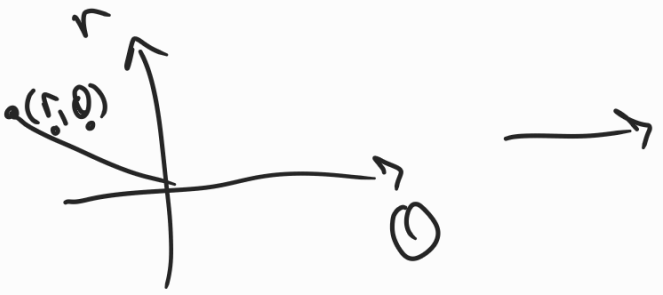
Drop a perp, project

Pyth. Thm.

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

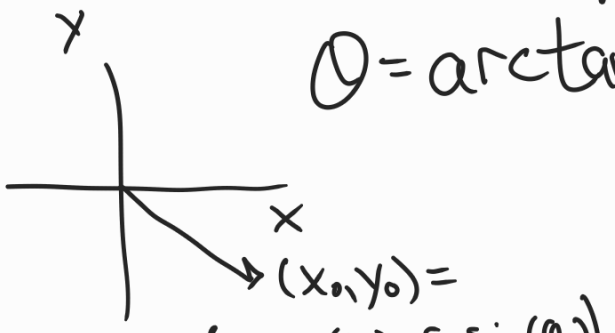
$r=1 \Rightarrow \sin^2(\theta_r) + \cos^2(\theta_r) = 1$.

r-θ plane



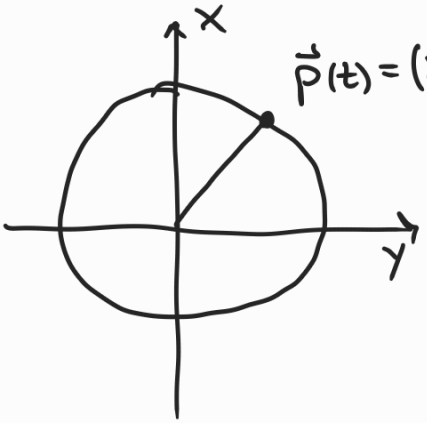
$r = \sqrt{x^2+y^2}$

$\theta = \arctan(y/x)$

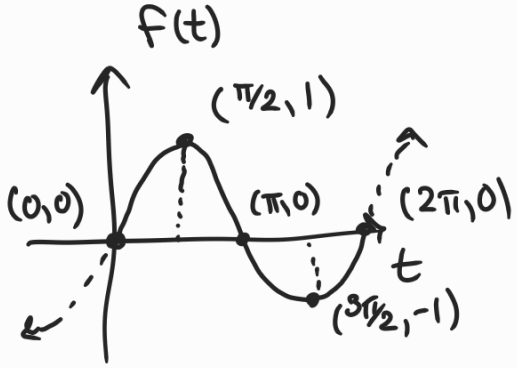


Plots

Spinning particle (microscope slide, slices)

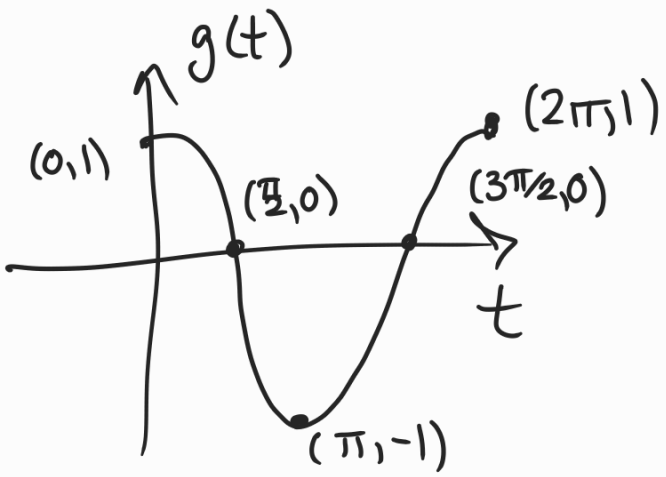


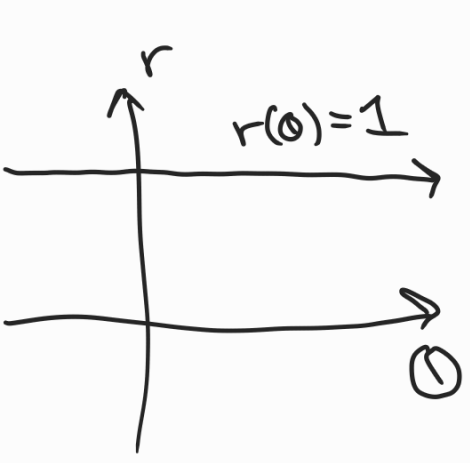
$f(t) = \sin(t)$ → vert



$\mathbb{C}$ ← Contains info of all!

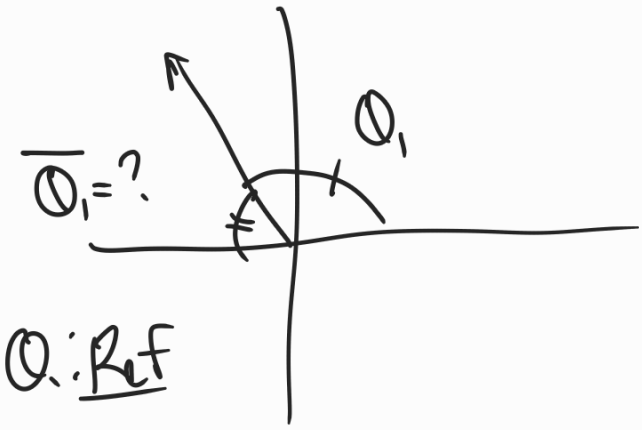
$g(t) = \cos(t)$ | horiz





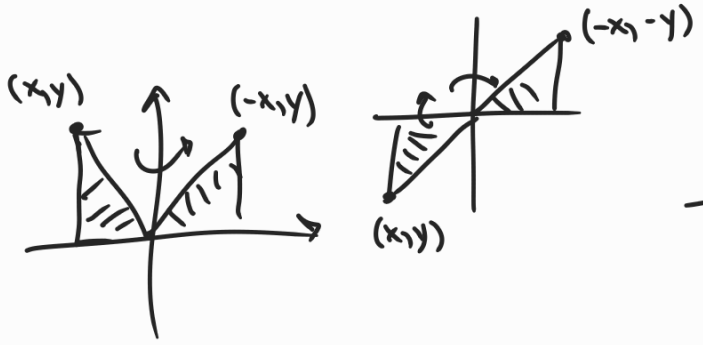
- Reference Angles

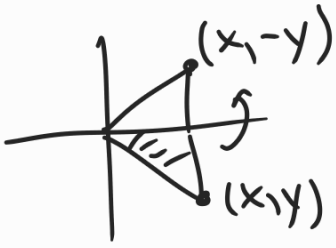
Have to use geometry & pictures



θ: Ref

Goal: Get a triangle w/ acute angle





Ex $\theta = 8\pi/3$