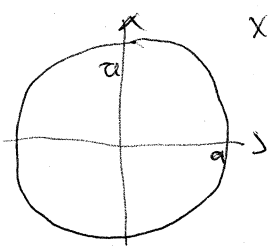
10.1 CURVES & PARAMETRIZED CURVES

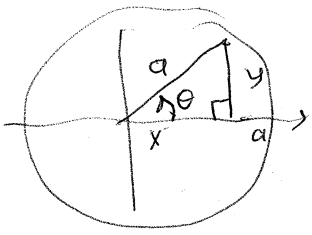
circle of radius a at origin in plane.



$x^2+y^2=a^2$ solutions of eqn = set of points on circle

"curve" = "path"

$r=a$ in polar coords, $0 \le \theta \le 2\pi$



$x = r\cos\theta \rightarrow x = a\cos\theta$

$y = r\sin\theta \quad\quad y = a\sin\theta$

as vary $\theta = 0 \to 2\pi$ make one revolution of circle.

θ is a parameter on which x, y depend.

"t" rename the time to think of tracing out circle in the counterclockwise direction

"PARAMETRIZED CURVE"

$x = a\cos t, \quad y = a\sin t$

$t = 0..2\pi$

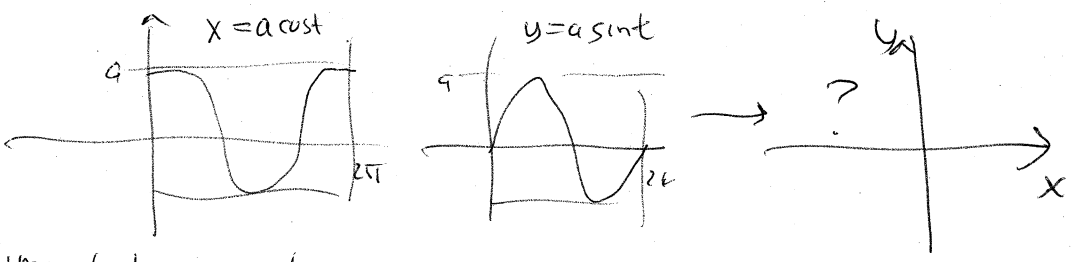
[we could also do $\theta = -t$: $t = 0..2\pi$

$x = a\cos(-t) = a\cos t$

$y = a\sin(-t) = -a\sin t$

increase t move in clockwise direction

what is the path?



Sometimes we can eliminate parameter:

$x^2+y^2 = (a\cos t)^2 + (a\sin t)^2 = a^2\cos^2 t + a^2\sin^2 t = a^2(\underbrace{\cos^2 t + \sin^2 t}_{1}) = a^2$.

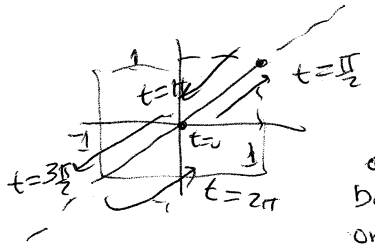
get eqn of circle BUT lose how you trace it out.

"PATH" or "CURVE".

EX $x = \cos t, \quad y = \sin t \quad t = 0..2\pi$

$\downarrow$

$y = x$ path but $|x| \le 1, |y| \le 1$



one oscillation back and forth on line segment between $(1,1)$ and $(-1,-1)$