4/1/2011 F
Section 12

5.1

Radian measure

Ch6 ↙ ↘ Ch5

angle

arclength on unit circle.

unit ↓ r=1

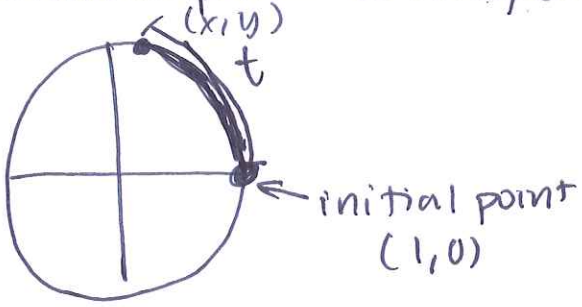
$s = r\theta$

on unit circle

$s = \theta$

Def

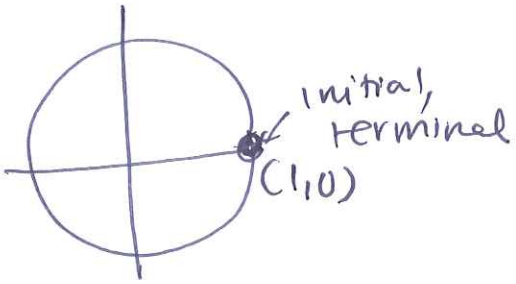
terminal point corresponding to t:



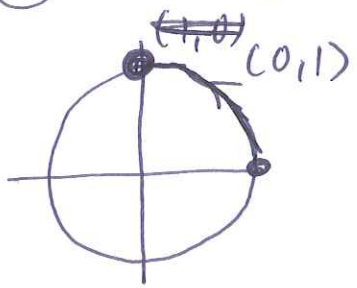
the point (x, y) that is t away from (1, 0) on the unit circle.

Example 1: Find ~~termidpoint~~ terminal point corresponding to t.

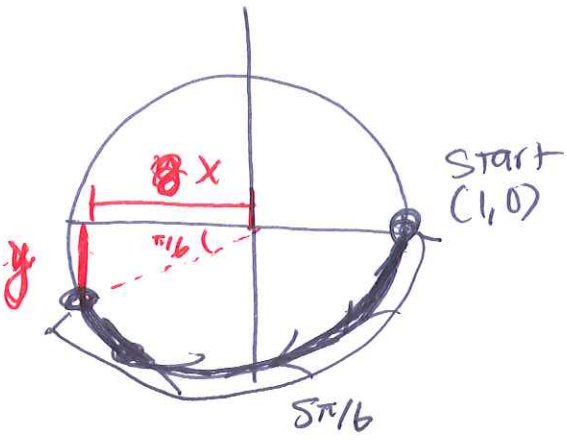
(a) $t = 0$



(b) $t = \pi/2$



(c) $t = -5\pi/6$



$\left(-\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$

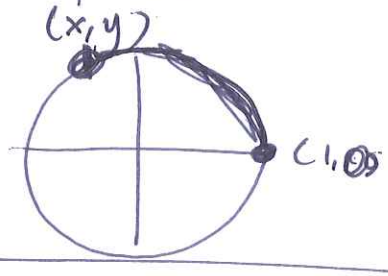
§5.2 Trig functions of real numbers

$\sin(t) = y$

$\cos(t) = x$

$\tan(t) = y/x$

(x,y) terminal point

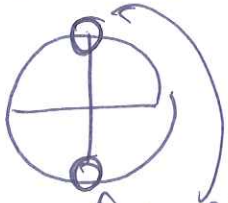


Domain:

$\sin(t)$: $(-\infty, \infty)$

$\cos(t)$: $(-\infty, \infty)$

$\tan(t)$: $x \neq 0$



$t \neq \pi/2, 3\pi/2, 5\pi/2, \ldots$

$-\pi/2, -3\pi/2, \ldots$

$t \neq \pi/2 + \pi k$, k is an integer.

Symmetries:

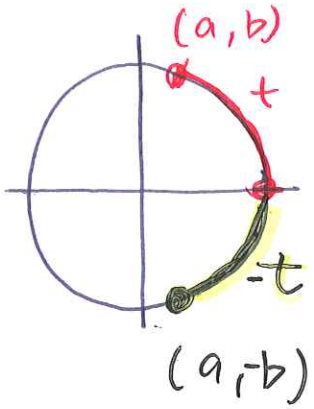
Even: $f(-x) = f(x)$ $\longleftrightarrow$ symm y axis

ODD: $f(-x) = -f(x)$ $\longleftrightarrow$ symm about origin.

Example2:

Q: Is $\sin(t)$ even, odd or neither?

$$\sin(-t) = -b = -(b) = -\sin(t)$$



$\sin(t)$ is odd.
(sym about origin)

Q: What about $\cos(t)$?

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

$\cos(t)$ is even
(sym about y-axis)

Example3: Using trig identities, determined if even, odd, neither

(a) $\sec(t)$.

$$\sec(-t) = \frac{1}{\cos(-t)} = \frac{1}{\cos t} = \sec(t)$$

$$\sec(-t) = \sec(t)$$

$\Rightarrow$ even.

(b) $\csc(t)$:

$$\csc(-t) = \frac{1}{\sin(-t)} = \frac{1}{-\sin(t)}$$

$$= -\csc(t)$$

$\Rightarrow$ ODD.

(c) $\tan(t)$:

$$\tan(-t) = \frac{\sin(-t)}{\cos(-t)} = \frac{-\sin(t)}{\cos(t)} = -\tan(t)$$

$\Rightarrow$ ODD.

(d) $\tan(t) + \sec(t)$:

$$\tan(-t) + \sec(-t) = \underbrace{-\tan(t)}_{\text{opp}} + \underbrace{\sec(t)}_{\text{same}}$$

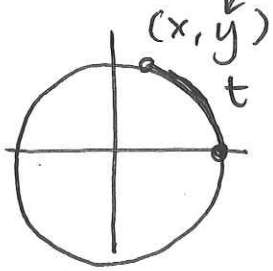
neither even nor odd

5.3 Graphs of sine/cosine.

$y = \sin(t)$

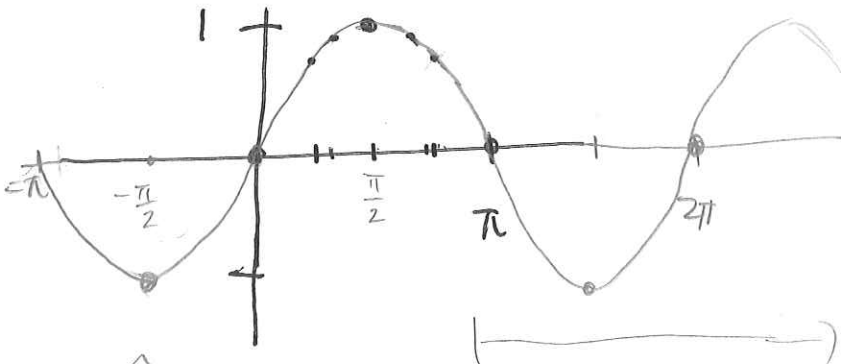
D: $(-\infty, \infty)$

R: $[-1, 1]$



vert value on circle!

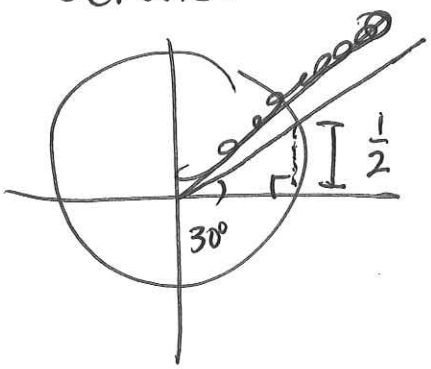
t	sin(t)
0	0
$\pi/6$	$1/2$
$\pi/4$	$\sqrt{2}/2$
$\pi/3$	$\sqrt{3}/2$
$\pi/2$	1
$2\pi/3$	$\sqrt{3}/2$
$5\pi/6$	$1/2$
π	0
$2\ 1/6\pi$	$1/2$

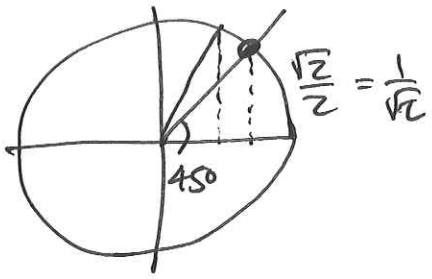


$\sin(-x) = -\sin x$

repeats! every 2π.

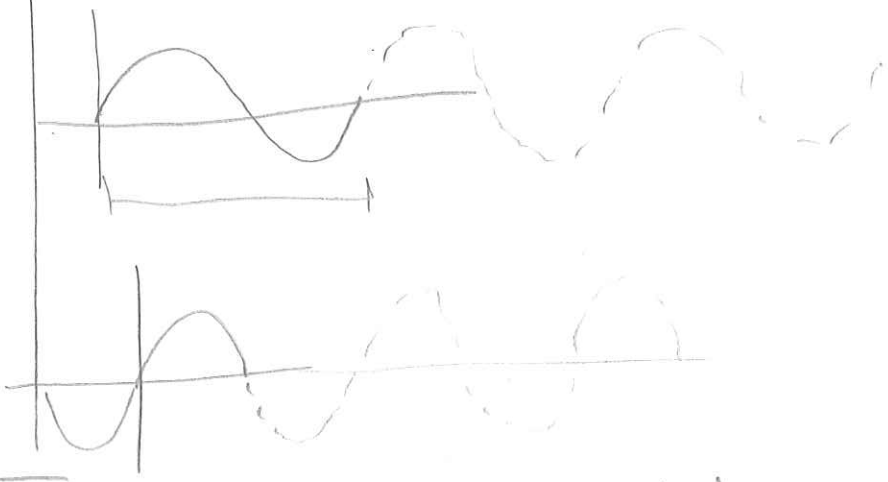
Scratch





sin(t) is periodic.

1 full cycle (pattern) can generate the entire graph.



Width of cycle = period

||

Smallest the number so that $f(x+p) = f(x)$ for all x.

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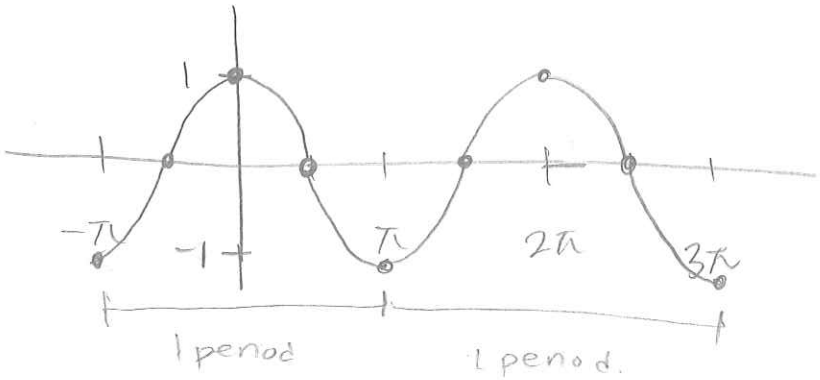
period of sin(t): 2π

amplitude: stretch away from middle.

amplitude 1.

$y = \cos(t)$



period: 2π

amp: 1

middle/avg: $y = 0$