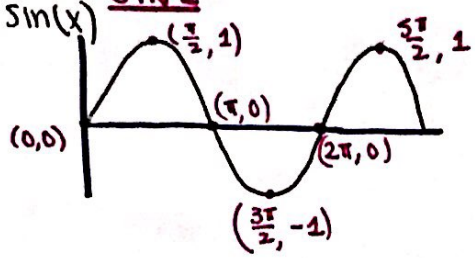
Acc Precalculus

Emily Thom
11-5-16
3RD

Trig Graphing Study Guide
Unit 5

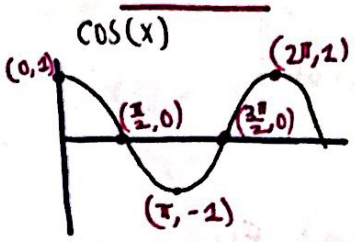
(I) Basic Trig Graphs

SINE



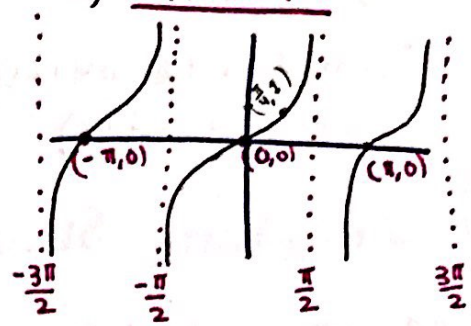
domain: $(-\infty, \infty)$
range: $[-1, 1]$
period: 2π

COSINE



domain: $(-\infty, \infty)$
range $[-1, 1]$
period: 2π

tan(x) TANGENT



domain: $y \neq \frac{\pi}{2} + \pi k$
range: $(-\infty, \infty)$
period: π

(II) Sinusoidal Functions

$y = a \sin(b(x-c)) + d$
$y = a \cos(b(x-c)) + d$] → general functions

$f\theta = \sin\theta$
$f\theta = \cos\theta$] → parent graphs

Periodic function: a function returning to the same value at regular intervals

$f(x) = f(x + 2\pi)$

a = **amplitude** (vertical stretch)
↳ the distance from the sinusoidal axis to the max or min point on the graph
-reflect over sinusoidal axis if a is negative

b = the number of cycles in 2π radians or $360°$
↳ 2π (or $360°$) ÷ the **period**
↳ distance from peak to peak

c = **phase shift** left (+) or right (-)

d = **vertical shift** up (+) or down (-) ⇒ equation of the **sinusoidal axis**

III Even vs odd

even: $y = \cos\theta$

- symmetrical across the y axis
- $f(-x) = f(x)$

odd: $y = \sin\theta$

- Symmetrical by rotating 180°
- $f(-x) = -f(x)$

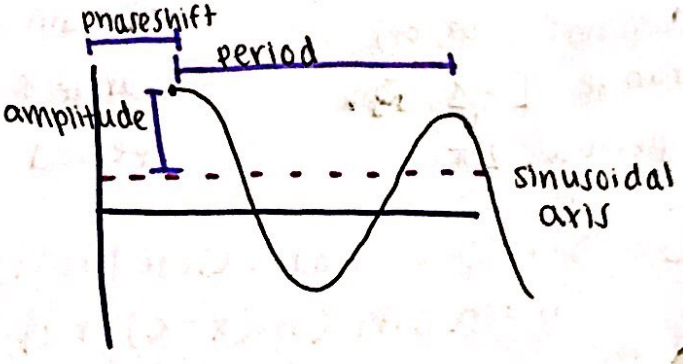
IV Graphing Sinusoidal Functions

→ find amplitude (a)

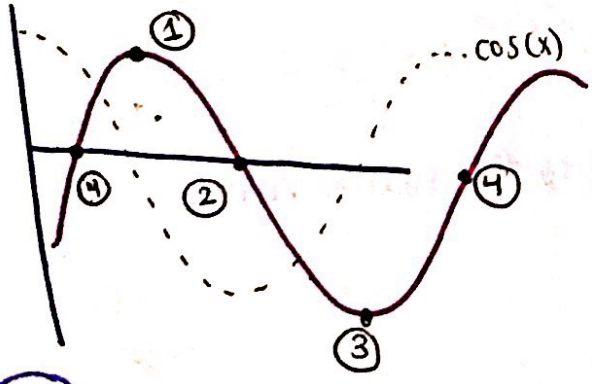
→ find period $\left(\frac{2\pi}{b}\right)\left(\frac{360}{b}\right)$

→ find phase shift left/right (c)

→ find sinusoidal axis (d)



V Phase Shifts



① phase shift for $\cos(x)$

② phase shift for $-\sin(x)$

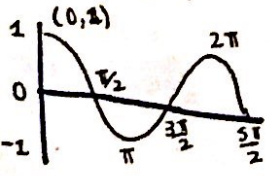
③ phase shift for $-\cos(x)$

④ phase shift for $\sin(x)$

VI Graphing: SEC, CSC, COT

SECANT

$y = \cos(x)$



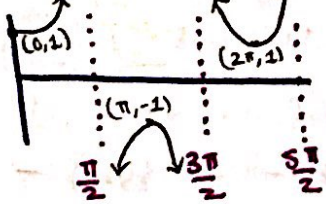
D: $(-\infty, \infty)$ P: 2π

R: $[-1, 1]$

$y = \sec\theta = \frac{1}{\cos(\theta)}$

* every time the graph hits the sinusoidal axis in the cos graph it will be undefined (asymptote) in the secant graph

$y = \sec(x)$



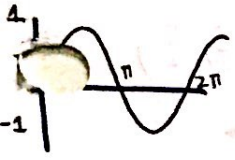
* max points on cos graph become min points on sec graph & vice versa

D: $x \neq \frac{\pi}{2} + \pi k$ P: 2π

R: $(-\infty, -1] \cup [1, \infty)$

COSECANT

$y = \sin(x)$

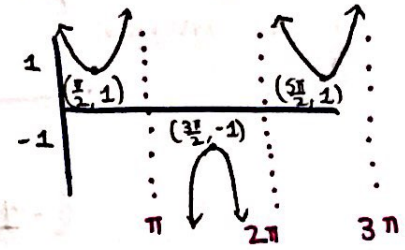


D: $(-\infty, \infty)$

R: $[-1, 1]$

P: 2π

$y = \csc(x)$



D: $x \neq 0 + \pi k$

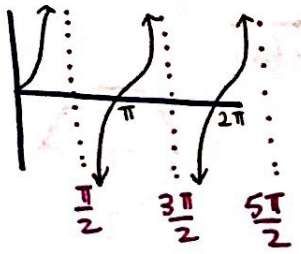
R: $(-\infty, -1] \cup [1, \infty)$

P: 2π

* the difference between sec + csc graphs is a phase shift

COTANGENT

$y = \tan(x)$

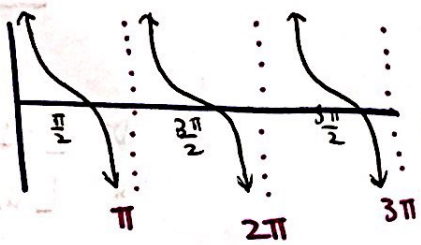


D: $x \neq \frac{\pi}{2} + \pi k$

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

P: π

$y = \cot(x)$



D: $x \neq 0 + \pi k$

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

P: π

→ to graph more complex equations

① graph sin, cos, tan function first

② create asymptotes where those graphs hit the sinusoidal axis

③ max points on those graphs become min points on new graphs

⇒ draw graphs approaching the asymptotes

VII Inverses of Trig Functions

notation:

function:

$y = \cos^{-1}(x)$

$y = \sin^{-1}(x)$

$y = \tan^{-1}(x)$

NOT a function:

$y = \arccos(x)$

$y = \arcsin(x)$

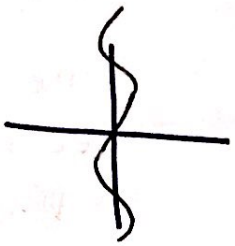
$y = \arctan(x)$

} ⇒ Relation

① Sine

$y = \arcsin(x)$

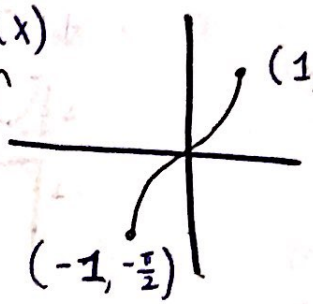
NOT a function, the graphical inverse of $y = \sin(x)$



D: $[-1, 1]$

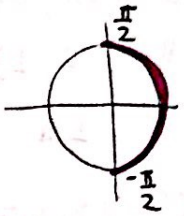
R: $(-\infty, \infty)$

$f(x) = \sin^{-1}(x)$ is a function



D: $[-1, 1]$

R: $[-\frac{\pi}{2}, \frac{\pi}{2}]$

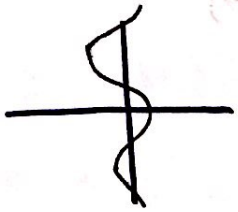


② Cosine

$y = \arccos(x)$

NOT a function

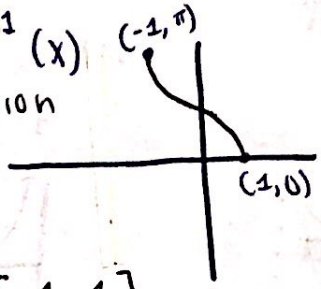
→ the graphical inverse of $y = \cos(x)$



D: $[-1, 1]$

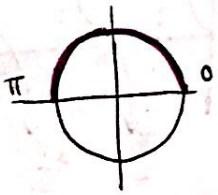
R: $(-\infty, \infty)$

$f(x) = \cos^{-1}(x)$ is a function



D: $[-1, 1]$

R: $[0, \pi]$

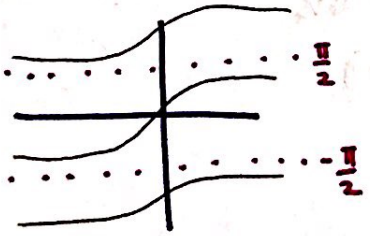


③ tangent

$y = \arctan(x)$

NOT a function

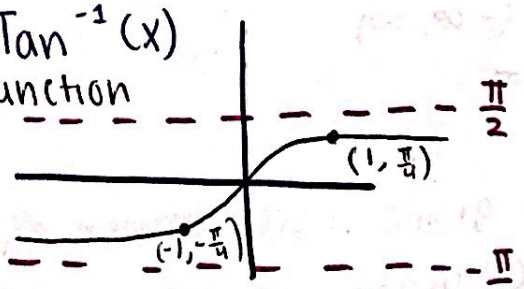
→ the graphical inverse of $y = \tan(x)$



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

R: $y \neq \frac{\pi}{2} + \pi k$

$f(x) = \tan^{-1}(x)$ is a function



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

R: $(-\frac{\pi}{2}, \frac{\pi}{2})$