PC 12 Session 16

March 2, 2022 8:59 AM

Pre-Calculus 12 Session 16
Thursday, March 3, 2022

1. Last Day's Homework:
   - Textbook Practice: Section 5.1: pages 233 to 237, Practise 1, 2, 3, 4a), d), 5b), d), 6, 7a), c), 8a), c), 9a), c), 10, 11a), c), 14, 18, Section 5.2: pages 250-255, Practise 2 to 7, 10, 14, 15a), c), 16a), c).
   - Readings: Nothing new.
   - Hand-in Assignments and other things: The Chapter 5 Hand-in Assignment may be due on Thursday, March 10.

2. Return of the Chapter 4 Hand-in Assignment

3. A little more about Section 5.2: Transformations of Sinusoidal Functions

4. Section 5.3: The Tangent Function

5. Section 5.4: Equations and Graphs of Trig Functions (a.k.a. solving Trig Equations and Applications)

6. Section 6.1: Reciprocal, Quotient and Pythagorean Identities

6. The Chapter 4 Test

Homework: This depends on how far we get today.

Readings: Nothing new.

Practice from Textbook to try:

Section 5.1: pages 233 to 237, Practise 1, 2, 3, 4a), d), 5b), d), 6, 7a), c), 8a), c), 9a), c), 10, 11a), c), 14, 18.
Section 5.2: pages 250-255, Practise 2 to 7, 10, 14, 15a), c), 16a), c).
Section 5.3: pages 262 to 265, Practise 1a), c), 2a), c), e), 3, 7, 8
Section 5.4: pages 275-279, Practise 1, 2, 3, 4a), c), 5a), c), 6, 8b), 9, 10, 14, 16, 19.
The Chapter 5 Review (pages 282-285), the Chapter 5 Practice Test (pages 286 and 287).
Section 6.1: pages 296-298, Practise 1a), c), 3, 4, 5, 6, 10, 11, 14, 15, 16.

Hand-in Assignments: You should start working on the Chapter 5 Hand-in Assignment. That assignment will likely be due on Thursday, March 10.

Some more about Graphing Sine & Cosine Functions

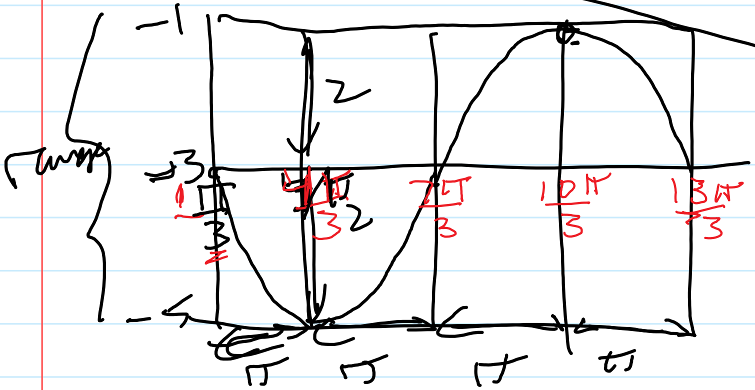
$y = a\sin(b(x-c))+d$ $\qquad$ $y = a\cos(b(x-c))+d$

$\frac{\pi}{3}$ to right

$y = -2\sin\left(\frac{1}{2}\left(x-\frac{\pi}{3}\right)\right)-3$

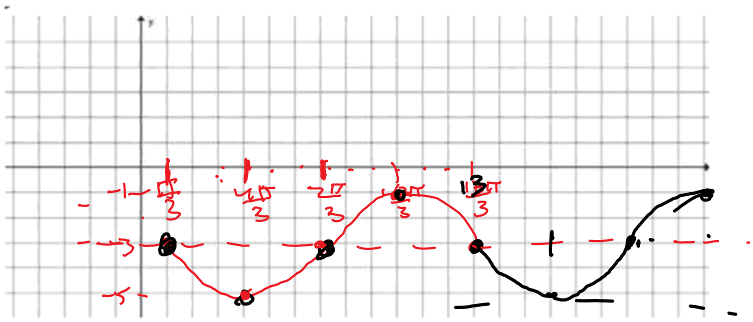
period $= \dfrac{2\pi}{\frac{1}{2}} = 4\pi$

KPS $= \frac{1}{4} \times 4\pi = \pi = \frac{3\pi}{3}$

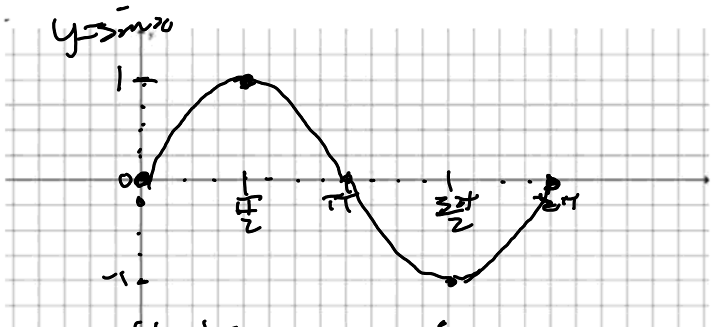


$\frac{12\pi}{3}$

1 sq $= \frac{\pi}{3}$



we can also graph $\left(y = -2\sin\left(\frac{1}{2}\left(x-\frac{\pi}{3}\right)\right)-3\right)$ using transformations of the 5 key points of $y=\sin x$



x	y
0	0
$\frac{\pi}{2}$	1
π	0
$\frac{3\pi}{2}$	-1
2π	0

reflection over x-axis

$y = -2\sin\left(\frac{1}{2}\left(x-\frac{\pi}{3}\right)\right)-3$

VE by factor 2

HE by factor $\frac{1}{1/2} = 2$

CERT's

x	y
0	0
$\pi/2$	-1
π	0
$\frac{3\pi}{2}$	1
2π	[illegible]

x	y
0	0
$\pi/2$	-2
π	0

x	y
	0

x	y
	-3

π	0
$\frac{3\pi}{2}$	1
2π	0

$\pi/2$	-2
π	0
$\frac{3\pi}{2}$	2
2π	0

x	y
0	0
π	-2
2π	0
3π	2
4π	0

x	y
$\frac{\pi}{3}$	-3
$\frac{4\pi}{3}$	-5
$\frac{7\pi}{3}$	-3
$10\pi/3$	-1
$\frac{13\pi}{3}$	-3

OR if it pleases you, you can use mapping notation.

$$(x, y) \to (x, -y) \to (x, -2y) \to (2x, -2y)$$

$(0, 0)$

$$\to \left(2x + \frac{\pi}{3}, -2y - 3\right)$$

$(\frac{\pi}{2}, 1)$

$$\to \left(2(0) + \frac{\pi}{3}, -2(0) - 3\right)$$

$$\left(\frac{\pi}{3}, -3\right)$$

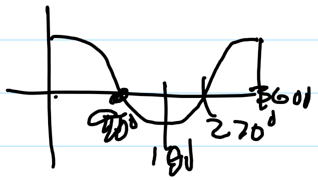
$$\to \left(2\left(\frac{\pi}{2}\right) + \frac{\pi}{3}, -2(1) - 3\right)$$

$$\left(\frac{4\pi}{3}, -5\right)$$

Consider $y = 3\cos\left(\frac{1}{3}(x - 30^\circ)\right) + 1$

HE by 3

for $y = \cos x$: KPS



x	y
0	1
90°	0
180°	-1
270°	0
360°	1

x	y
0	2
90°	0
180°	-2
270°	0
360°	2

x	y
0	$+2$
270°	0
540°	-2
810°	0
1080°	2

x	y
30°	$+3$
300°	1
570°	-1
840°	1
1110°	3
	1

Period = 1080

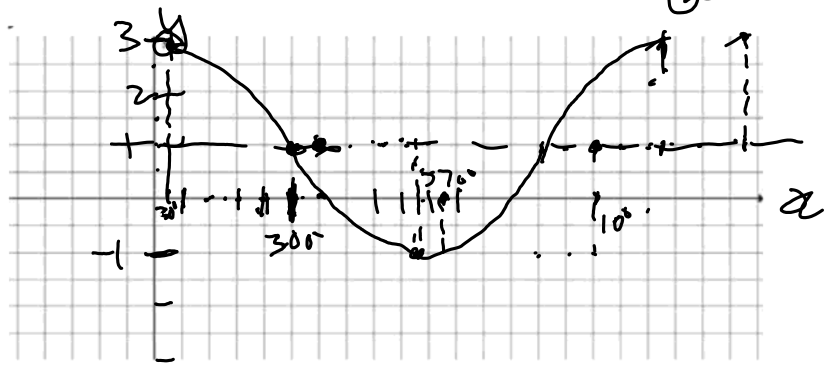
KPS

$\frac{1}{4} \times 1080^\circ = 270^\circ$

$4\frac{1}{2}$ squares

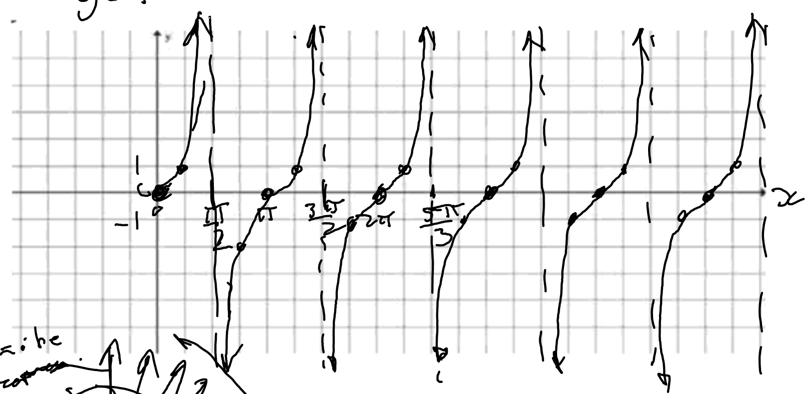
$1 sq = ~~30~~$?

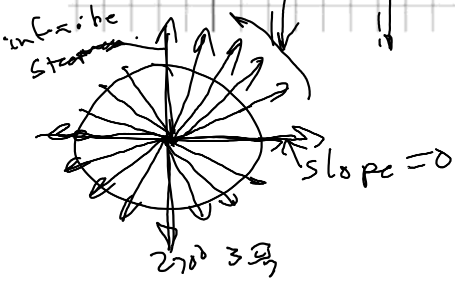
159 = ~~30~~ ? 600°



5.3 The tangent function

y = tan x





(from "lesson 5"

1. For each of the following, state the domain, range, period and the general equation of the asymptote.

   a. $y = \tan\left(x - \frac{\pi}{3}\right)$

   b. $y = \tan 4x - 1$

   c. $y = \tan 2(x + \pi)$

   d. $y = \tan\left(3x - \frac{\pi}{2}\right)$

   e. $y = \tan\frac{\pi}{4}(x + 2) + 3$

a) $y = \tan(x - \frac{\pi}{3}) \leftarrow \frac{\pi}{3}$ to right

<u>$y = \tan x$</u>

x-ints: $x = n\pi$

$(n \in I)$

equations of asymptotes

$x = \frac{\pi}{2} + n\pi$

$(n \in I)$

$y = \tan(x - \frac{\pi}{3})$

x-ints: $x = n\pi + \frac{\pi}{3}$

equations of asymptotes:

$x = \frac{\pi}{2} + n\pi + \frac{\pi}{3}$

$x = \frac{\pi}{2} + \frac{\pi}{3} + n\pi$

$x = \frac{3\pi}{6} + \frac{2\pi}{6} + n\pi$

$x = \frac{5\pi}{6} + n\pi$

$\frac{\pi}{3} = 60°$

$y = \tan(x - 60°)$

<u>$y = \tan x$</u>

x-ints: $x = 180° n$

asymptotes:
$x = 90° + 180° n$

$y = \tan(x - 60°)$.

x-ints $= 180° n + 60°$
$= 60° + 180° n$.

asymptotes:
$x = 150° + 180° n$.

e) $y = \tan[\frac{\pi}{4}(x + 2)] + 3$

period $:= \frac{\pi}{\frac{\pi}{4}} = \pi \times \frac{4}{\pi} = \underline{\underline{4}}$ rational period.

2 units left + 3 units up.

<u>equations of asymptotes</u>

$y = \tan x$
at $x = (\frac{\pi}{2} + n\pi) \times \frac{4}{\pi} - 2$

LHE by $\frac{4}{\pi}$

$y = \tan(\frac{\pi}{4}(x + 2)) + 3$

$\frac{1}{b} = \frac{4}{\pi}$

$x = (\frac{\pi}{2} + (n\pi))\frac{4}{\pi} - 2$

$= (\frac{4\pi}{...} \quad \frac{4n\pi}{...}) - 2$

$$x = \left(2 \qquad\right) \pi$$

$$= \left(\frac{4\cancel{\pi}}{2\cancel{\pi}} + \frac{4\cancel{\pi}n}{\cancel{\pi}}\right) - 2$$

$$= (\cancel{2} + 4n) - \cancel{2}$$

$$x = 4n$$

$y = \underline{\tan x}$

x-ints at $x = n\pi$

$$y = \left(\frac{\pi}{4}(x+2)\right) + 3$$

$$x\text{ints}: (n\cancel{\pi})\left(\frac{4}{\cancel{\pi}}\right) - 2$$

$$= 4n - 2.$$

Like sine & cosine functions, tan functions may also have rational periods.