PC 12 Session 15

February 28, 2022 1:03 PM

Pre-Calculus 12 Session 15
Tuesday, March 1, 2022

- Last Day's Homework:
  - Textbook Practice: Section 4.4: pages 211-213, Practise 1a), c), 2, 3a), c), 4a), c), 5a), c), e), 6a), c), e), 7 (all), 9, 13, 16. The Chapter 4 Review (pages 215 to 217), the Chapter 4 Practice Test (pages 218 and 219) and the Chapter 4 Review package I gave out last day.
  - Readings: Nothing new.
  - Hand-in Assignments and other things: The Chapter 4 Hand-in Assignment is due in today. The Chapter 4 Test will be on Thursday, March 3.

- A look at the Chapter 4 Hand-in Assignment Answers
- Section 5.1: Graphing Sine and Cosine Functions
- Section 5.2: Transformations of Sinusoidal Functions
- Section 5.3: The Tangent Function
- Section 5.4: Equations and Graphs of Trig Functions (a.k.a. solving Trig Equations and Applications)
- Section 6.1: Reciprocal, Quotient and Pythagorean Identities

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. The Chapter 4 Test will be on Thursday, March 3 (unless you convince me to move it to Tuesday, March 8).

last class B4 Spring Break is Thursday March 10.

Section 5.1 deals with the basic graphs of $y = \sin x$ and $y = \cos x$.

of $y = \sin x$ and $y = \cos x$
$(y = \sin\theta)$ $(y = \cos\theta)$

- It also introduces transformations

  - a vertical expansion/compression changes the amplitude.

$y = a\sin x$ amplitude $= |a|$ $y = a\cos x$

if $a < 0$, there's also a reflection over the x-axis.

  - a horizontal expansion/compression changes the period.

$y = a\sin bx$ $y = a\cos bx$

$\text{period} = \frac{2\pi}{|b|}$ or $\text{period} = \frac{360^\circ}{|b|}$

- if $b < 0$ there's a reflection across the y-axis.

Section 5.2 deals with more transformations of graphs of sinusoidal functions
(sine or cosine)

→ specifically, it deals with translations.

$y = f(x) \longrightarrow y = f(x) + 3$ translation of 3 units up.

$y = f(x) - 2$ translation of 2 units down.

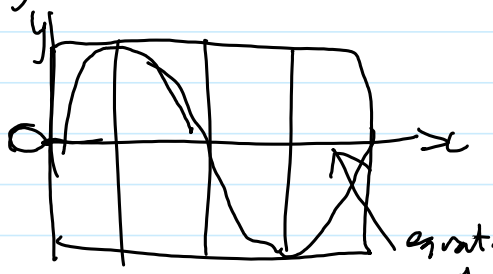
For graphs of trig functions a vertical translation is called a vertical displacement.

$y = a\sin bx \longrightarrow y = a\sin bx + d$

- a vertical displacement of "d"

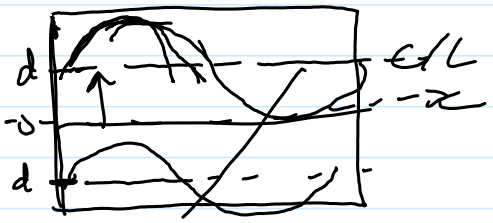
A vertical displacement changes the location and equation of the center-line (mid line)

$y = a\sin bx$



equation of C/L: $y = 0$

$y = a\sin bx + d$



equation of C/L: $y = d$

Phase shift - a horizontal translation (left or right) is called a phase shift.

$y = f(x) \rightarrow y = f(x - c)$ If $c > 0$, there is a translation of c units to the right.

$y = f(x) \rightarrow y = f(x - 2)$ 2 units right.

$\rightarrow y = f(x + 5)$ 5 units left.

$y = f(x - -5)$

$y = \cos x$ is $y = \sin x$ 90° phase-shifted $\frac{\pi}{2}$ units to the left

$y = \cos x \quad y = \sin\left(x + \frac{\pi}{2}\right)$

identical.

Or $y = \sin x$ is $y = \cos x$ 90° phase shifted $\frac{\pi}{2}$ units to the right.

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

$y = \sin x$ $\quad y = \cos\left(x - \frac{\pi}{2}\right)$ identical.

Sinusoidal functions with rational periods

for $y = a\sin[b(x-c)] + d$ or $y = a\cos[b(x-c)] + d$

The period equals: $p = \frac{2\pi}{b}$ or $\frac{360^\circ}{b}$

The value b is usually an integer or a rational number (i.e. a decimal or a fraction)

$y = 2\sin\left[\tfrac{2}{3}\left(x - \tfrac{\pi}{3}\right)\right] + 4$

period $= \frac{2\pi}{2/3} = 3\pi$ This is an irrational number.

$2\pi \times \frac{3}{2} = 3\pi$

period $= \frac{360^\circ}{2/3} = 540^\circ$ rational.

$\frac{360^\circ}{2} \times 3$ $\quad \frac{180}{}$

When working in radians, the period can be a rational number if b is a fraction of π or a multiple of π

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

$b = \frac{2\pi}{3}$ $\quad$ period: $\frac{2\pi}{2\pi/3} = 2\pi \times \frac{3}{2\pi} = 3$

For $y = a\cos\left[\frac{2\pi}{p}(x-c)\right] + d$

or $y = a\sin\left[\frac{2\pi}{p}(x-c)\right] + d$ $\quad$ p = period.

$y = 3\sin\left(\frac{2\pi}{9}x\right)$ $\quad$ period = 9 units.