Week 12 Trigonometric Functions Continued Lecture Note

Notebook:	Computational Mathematics		
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Cornell Notes	**Topic:** Trigonometric Functions Continued	Course: BSc Computer Science Class: Computational Mathematics[Lecture] Date: July 08, 2020

Essential Question:

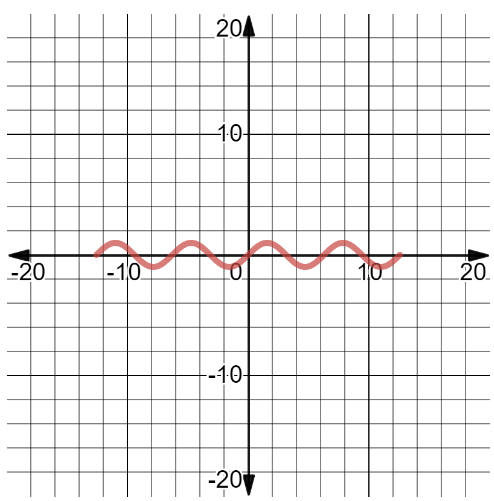
What are properties for the various trig functions?

Questions/Cues:

- What are the properties for sin(x)?
- What are properties of cos(x)?
- What are properties of tan(x)?
- What are the properties of 2 sin(x)?
- What are the properties of cos(2x)?
- How is frequency defined?
- How do you consider the $\sin(\omega x)$?

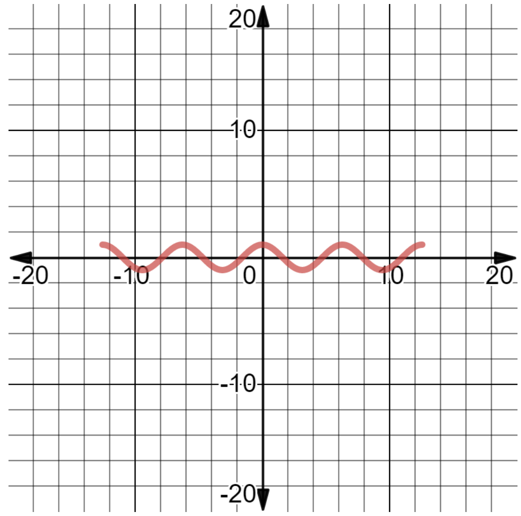
Notes

- Sin(x) = The period for this function is 2 pi, which means the curve repeats every 2 pi



  - If we place dashed lines or as they are called asymptotes at the zeros of sin(x), we see that the distance from one line to the next is 2 pi
  - The y-values for the sine curve are between -1 and 1 (including the endpoints). These are the peaks and troughs of the curve

- Cos(x) = The period for this function is 2 pi, which means the curve repeats every 2 pi

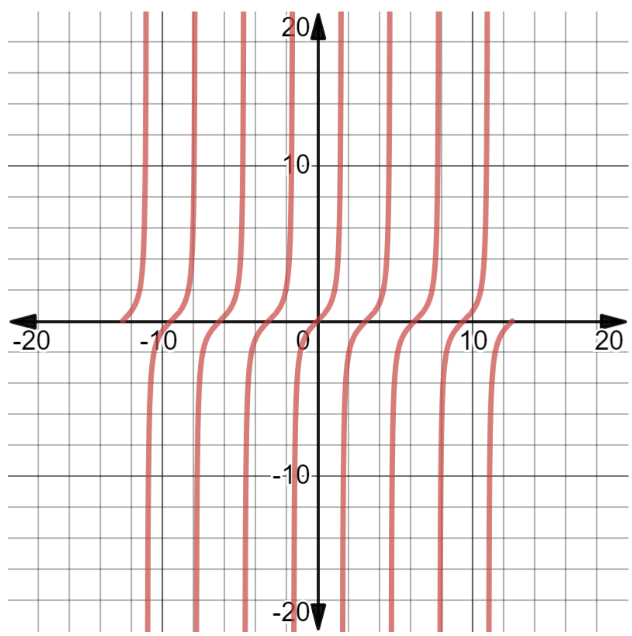


  - We can see from the graph that the curve for cos(x) is just the sine curve shifted over pi/2
  - The y-values for the cosine curve are between -1 and 1 (including the endpoints). These are the peaks and troughs of the curve

	period	frequency	amplitude
$\sin x$	2π	$\frac{1}{2\pi}$	1
$\cos x$	2π	$\frac{1}{2\pi}$	1

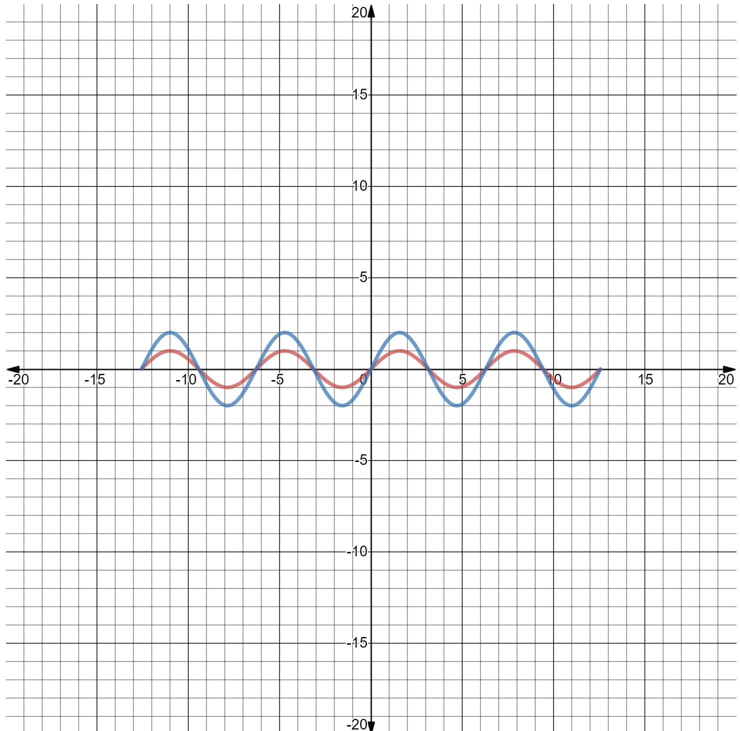
    - Period is between two maximums and half the period is between one maximum and one minimum

- Tan(x) = sin(x)/cos(x)



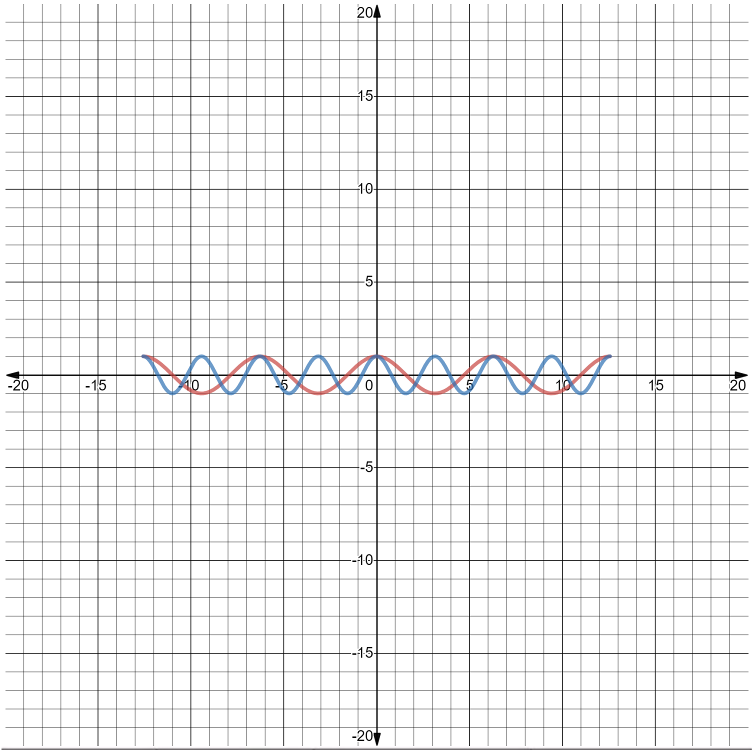
  - Is periodic like the other functions, with a period of pi
  - Is divergent when cos(x) = 0, undefined
    - Has vertical asymptotes there
    - For any odd multiple of pi/2

        - Will have positive divergence when sine is positive or negative when sine is negative
    - $\tan(\pi - x) = \tan(x)$
    - $\tan(\pi + x) = -\tan(x)$
- 2 sin(x) = Has the same period as sin(x), but the amplitude is doubled
    - Having a coefficient in front, affects the amplitude for the function



	period	frequency	amplitude
$\sin x$	2π	$\frac{1}{2\pi}$	1
$2\sin x$	2π	$\frac{1}{2\pi}$	2

- Cos(2x) = The amplitude is the same as the cosine curve, but since the distance between two maximums is half of the original, the period is pi instead of 2pi. So the curve is more condensed horizontally and more periods are covered in one cycle



	period	frequency	amplitude
$\cos x$	2π	$\frac{1}{2\pi}$	1
$\cos 2x$	π	$\frac{1}{\pi}$	1

- Frequency (f)= $\frac{1}{period} = \frac{1}{T}$

$$\sin(\omega x)$$
$$y = \omega x$$
$$\sin(y) \rightarrow \left\{ \begin{matrix} T_y = 2\pi \\ f_y = \frac{1}{T_y} = \frac{1}{2\pi} \end{matrix} \right\}$$
$$\text{Since } x = \frac{y}{\omega} \Rightarrow T_x = \frac{T_y}{\omega} = \frac{2\pi}{\omega}$$
$$f_x = \frac{1}{T_x} = \frac{\omega}{2\pi}$$

Summary

In this week, we learned about the properties of the sine, cosine and tangent functions, characteristics like period, frequency and amplitude. Lastly we touched on various examples with differing characteristics.