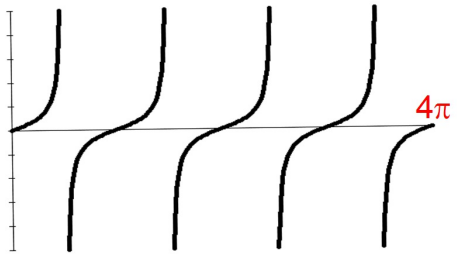
Sec 13-6: The Tangent Function

Graph the function $y=\text{Tan}x$

Use this Window: $x:[0,4\pi]$ $y:[-10, 10]$



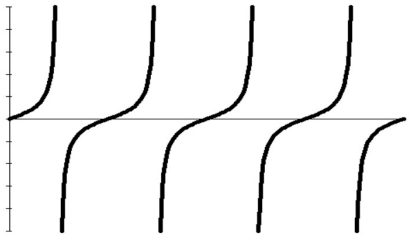
What is the period of the Tangent Function?

$\text{period} = \frac{4\pi}{4} = \pi$

Why does the graph of

y = Tanx look like this?

$\text{Tan}\theta = \frac{y}{x}$

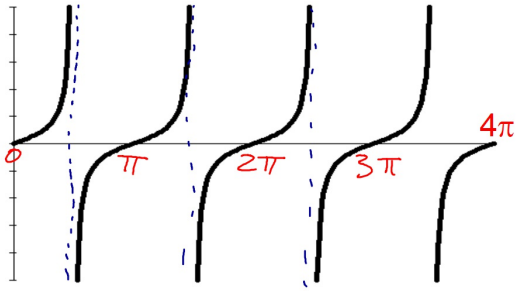


When y = 0

Tanx = 0 and there is an x-intercept

When x = 0

Tanx is undefined and there is a Vertical Asymptote



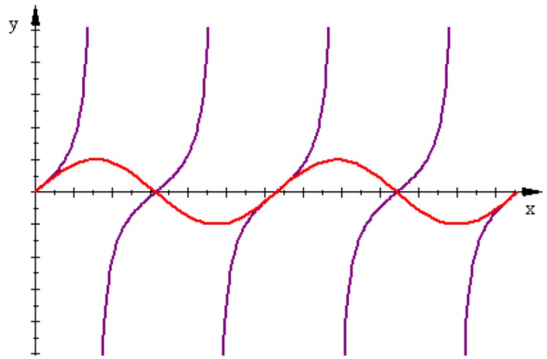
$\text{Tan}\theta = \frac{y}{x}$

Period of Tanx = π

What are the Vertical Asymtpotes? $\pm\frac{\pi}{2}, \pm\frac{3\pi}{2}, \pm\frac{5\pi}{2}, \pm\frac{7\pi}{2}, \cdots$

What are the x-intercepts? $0, \pm\pi, \pm 2\pi, \pm 3\pi, \cdots$

Leave Y_1 = Tanx. Graph Y_2 = Sinx.

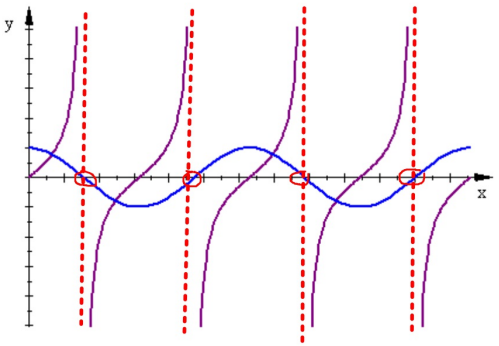


How is the graph of Tanx related to the graph of Sinx?

Tanx has x-intercepts wherever Sinx has x-intercepts.

In other words, Tanx is zero wherever Sinx is zero.

Leave Y_1 = Tanx. Graph Y_2 = Cosx.



How is the graph of Tanθ related to the graph of Cosθ?

Tanθ has a VA wherever Cosθ is zero.

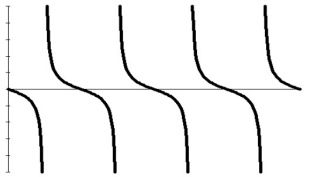
$$\text{Tan}\theta = \frac{y}{x} = \frac{\text{Sin}\theta}{\text{Cos}\theta}$$

$$y = a\text{Tan}(bx) = a\left(\frac{\text{Sin}(bx)}{\text{Cos}(bx)}\right)$$

a: If a<0 there is an x-axis reflection

b: The period of Tanbx = $\frac{\pi}{b}$

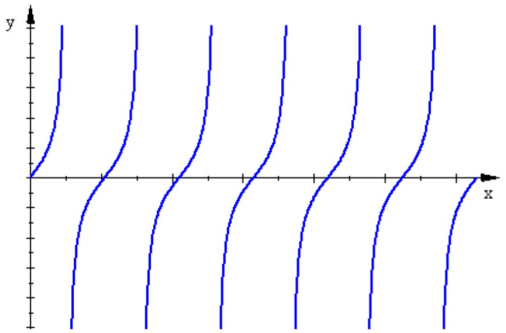
$b = \frac{\pi}{\text{period}}$



VA occur wherever Cos(bx)=0 x-coord on Unit Circle = 0

x-int occur wherever Sin(bx)=0 y-coord on Unit Circle = 0

The Tangent function is graphed in the window 0 to 2π.



1. What is the period?

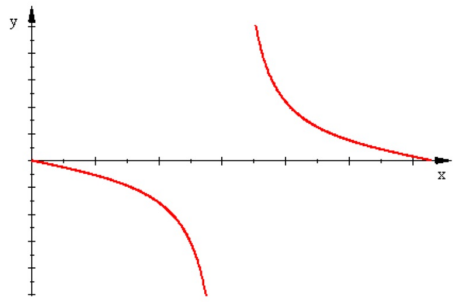
$\frac{2\pi}{6} = \frac{\pi}{3}$

2. What is the equation of this Tangent Function?

$b = \frac{\pi}{\frac{\pi}{3}} = \pi \cdot \frac{3}{\pi} = 3$

$y = \tan 3x$

The Tangent function is graphed in the window 0 to 2π.



1. What is the period?

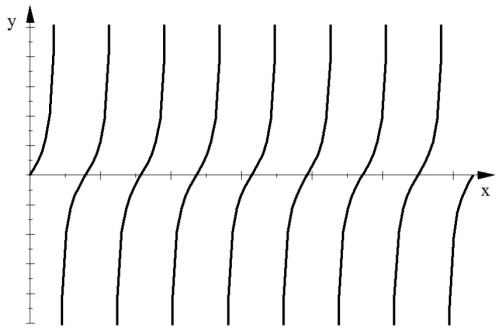
$\frac{2\pi}{1} = 2\pi$

2. What is the equation of this Tangent Function?

$b = \frac{\pi}{2\pi} = \frac{1}{2}$

$y = -\tan \frac{x}{2}$

The Tangent function is graphed in the window 0 to 2π.



1. What is the period?

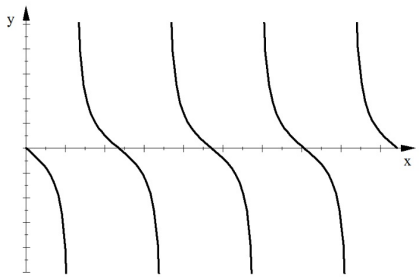
$\frac{2\pi}{8} = \frac{\pi}{4}$

2. What is the equation of this Tangent Function?

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

$y = \tan 4x$

The Tangent function is graphed in the window 0 to 6π.



1. What is the period?

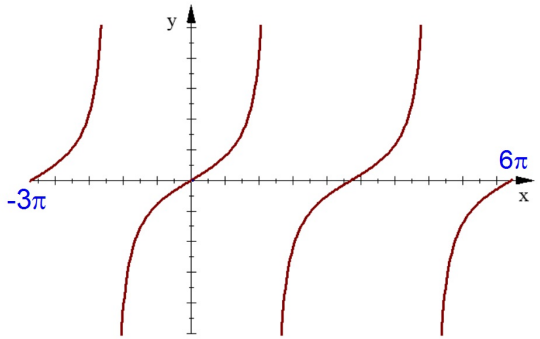
$\frac{6\pi}{4} = \frac{3\pi}{2}$

2. What is the equation of this Tangent Function?

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

$y = -\tan \frac{2x}{3}$

Write the equation of this Tangent Function



1. What is the period?

$\frac{9\pi}{3} = 3\pi$

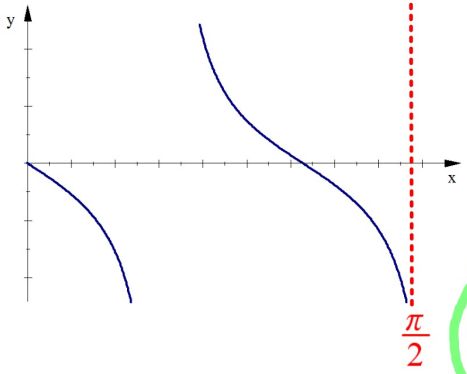
$\frac{6\pi}{2} = 3\pi$

EQ:

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

$y = \tan\frac{x}{3}$

Write the equation of this Tangent Function



1. What is the period?

$\frac{\frac{\pi}{2}}{1\frac{1}{2}} \rightarrow \frac{\frac{\pi}{2}}{\frac{3}{2}}$

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

EQ:

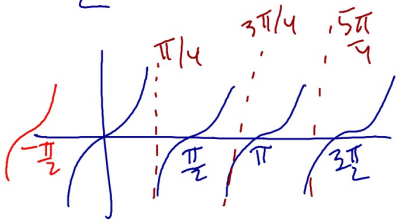
$b = \frac{\pi}{\frac{\pi}{3}} = 3$

$y = -\tan 3x$

$y = \tan(2\theta)$

What is the period?

$\frac{\pi}{2}$



Find three VA and three x-int.

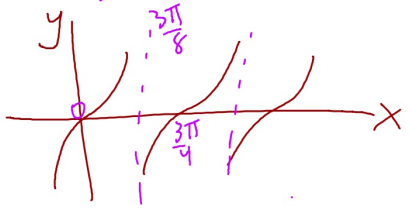
x-int: $0, \pm\frac{\pi}{2}, \pm\pi$

VA: $x = \pm\frac{\pi}{4}, \pm\frac{3\pi}{4}, \pm\frac{5\pi}{4}$

$y = \tan\frac{4\theta}{3}$

What is the period?

$\frac{\frac{\pi}{4}}{\frac{3}{3}} = \frac{3\pi}{4}$



Find three VA and three x-int.

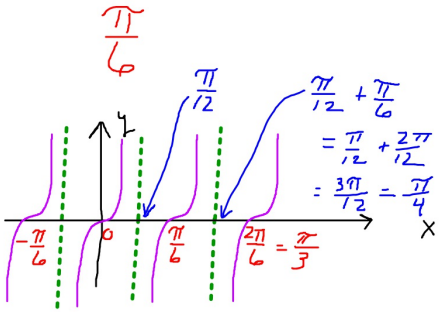
x-int: $0, \pm\frac{3\pi}{4}, \pm\frac{3\pi}{2}$

VA: $x = \pm\frac{3\pi}{8}, \pm\frac{9\pi}{8}, \pm\frac{15\pi}{8}$

$y = \text{Tan}6x$

What is the period?

Find three VA and three x-int.



X-Int: $x = 0, \pm\frac{\pi}{6}, \pm\frac{\pi}{3}, \ldots$

VA $x = \pm\frac{\pi}{12}, \pm\frac{\pi}{4} \ldots$

You can now complete Homework #30

Sec 13-6

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Problems 9-12, 38, 40

Due Tomorrow

Section 13-8: The Reciprocal Trig Functions

Cotangent: $\cot\theta = \frac{1}{\tan\theta} = \frac{x}{y} = \frac{\cos\theta}{\sin\theta}$

Secant: $\sec\theta = \frac{1}{\cos\theta} = \frac{1}{x}$

Cosecant: $\csc\theta = \frac{1}{\sin\theta} = \frac{1}{y}$

Use your calculator to find the value of each to the nearest hundredth.

Tan(-85°)= -11.43

Sec 33°= $\frac{1}{\cos 33^\circ} = 1.19$

Csc 14 = $\frac{1}{\sin 14} = 1.01$ (radians)

Sin $\frac{7\pi}{11}$ = 0.91

Cot $\frac{3\pi}{8} = \frac{1}{\tan\frac{3\pi}{8}} = 0.41$