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$y = \sin x$
$y = \cos x$

$Amp = A = \frac{Max - Min}{2}$

$Vertical = (C) = \frac{Max + Min}{2}$

$period = p$

Horizontal Stretch/Shrink

$B = \frac{2\pi}{p}$

How to choose an appropriate model based on the behavior at some given time, T.

$y = A \cos B(t - T) + C$
if at time T the function attains a maximum value

$y = -A \cos B(t - T) + C$
if at time T the function attains a minimum value

$y = A \sin B(t - T) + C$
if at time T the function halfway between a minimum and a maximum value

$y = -A \sin B(t - T) + C$
if at time T the function halfway between a maximum and a minimum value

Construct a sinusoid with the given amplitude and period that goes through the given point.

A) Amp: 4, period 4π, point (0, 0)

$y = 4\sin(bx)$

$y = 4\sin\left(\frac{1}{2}x\right)$

$y = -4\sin\left(\frac{1}{2}x\right)$

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

$\frac{4\pi}{1} = \frac{2\pi}{b}$

$b = \frac{2\pi}{4\pi} = \frac{1}{2}$

$y = 4\cos\frac{1}{2}(x - \pi)$

$\frac{1}{2}x - \frac{\pi}{2}$

B) Amp: 2.5, period $\frac{\pi}{5}$, point (2, 0)

$y = 2.5\sin 10(x - 2)$

~~$2.5\sin(10x - 2)$~~

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

$\frac{2\pi}{b} = \frac{\pi}{5}$

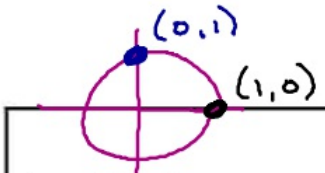
$b\pi = 10\pi$

$b = 10$

80) Temperature Data: The normal monthly Fahrenheit temperatures in Helena, MT, are shown in the table below (month 1 = January)

Model the temperature T as a sinusoidal function of time using 20 as the minimum value and 68 as the maximum value. Support your answer graphically by graphing your function with a scatter plot.

M	1	2	3	4	5	6	7	8	9	10	11	12
T	20	26	35	44	53	61	68	67	56	45	31	21



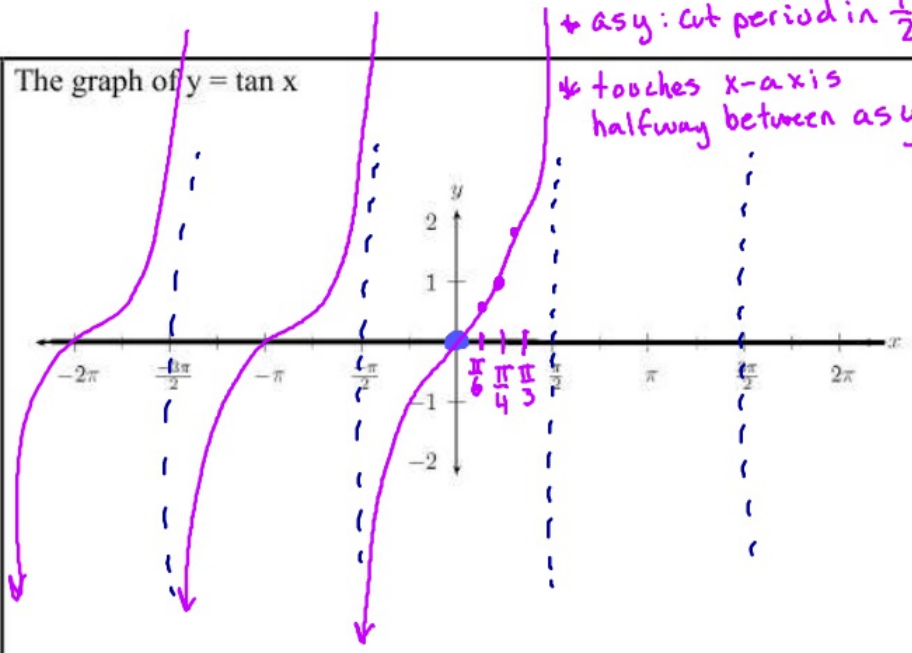
$\tan 0° = \frac{0}{1} = 0$

$\tan 90° = \frac{1}{0} \rightarrow$ UND

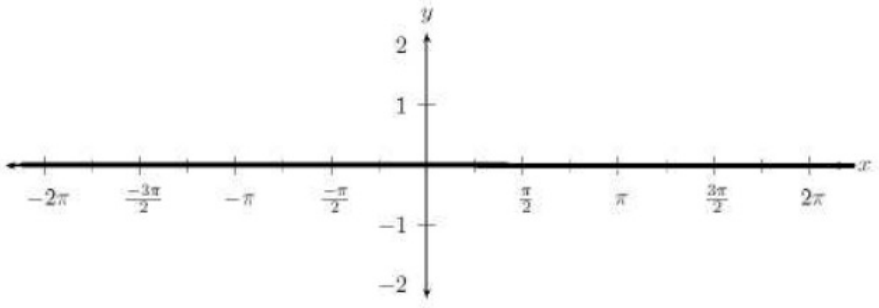
	$\tan\theta$
30	$\frac{1}{\sqrt{3}} \approx .577$
45	1
60	$\sqrt{3} \approx 1.73$

The graph of y = tan x

* period = π
* asy: cut period in $\frac{1}{2}$
* touches x-axis halfway between asy



The graph of y = cot x



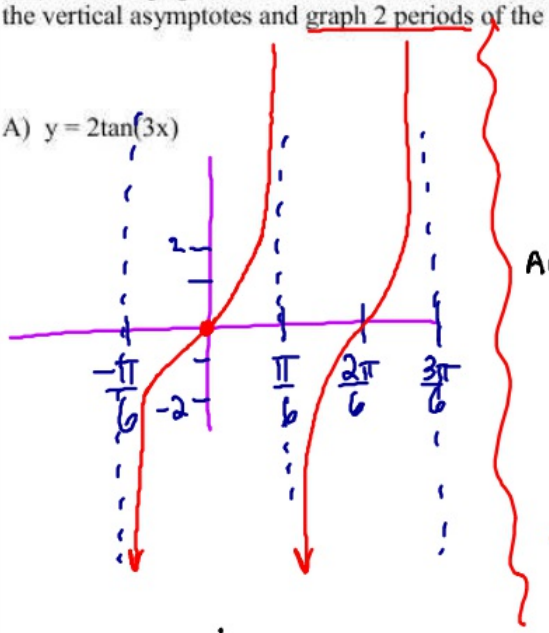
Describe the graph of the function in terms of a basic trigonometric function. Locate the vertical asymptotes and graph 2 periods of the function.

A) $y = 2\tan(3x)$

Amp = 2

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

asy = $\pm\frac{\pi}{6}$



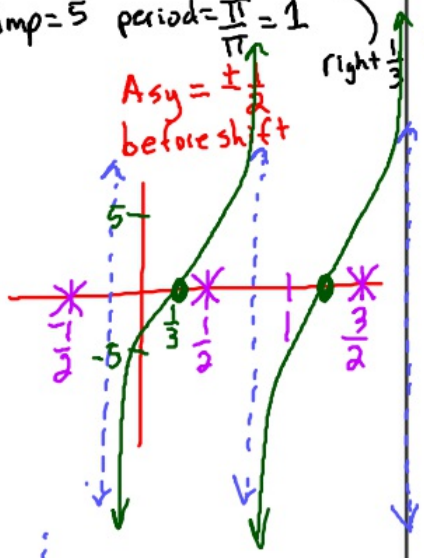
B) $y = 5\tan\left(\pi x - \frac{\pi}{3}\right)$

$y = 5\tan\pi\left(x - \frac{1}{3}\right)$

Amp = 5 period = $\frac{\pi}{\pi} = 1$

right $\frac{1}{3}$

Asy = $\pm\frac{5}{2}$ before shift



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

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

Asym = $\pm\frac{\pi}{4}$

befor shift

Right $\frac{\pi}{4}$

up 2