February 19, 2020

4.4 - Day 3 - Cotangent (COT) Functions

The graph of ***y = cot x*** represents the ratio of the ***x/y*** of the points around the unit circle, *or you can think of it as the reciprcal of the slope of the radius* as it rotates around the circle.

y = cot x

Let's start with the parent function, *y* = tan *x* ...

*To create the graph of **y = cot x**, you must take the y-value of each point of y = tan x and take the reciprocal (1/y).*

- Where there is a vertical asymptote, you now have zero points (on the midline).

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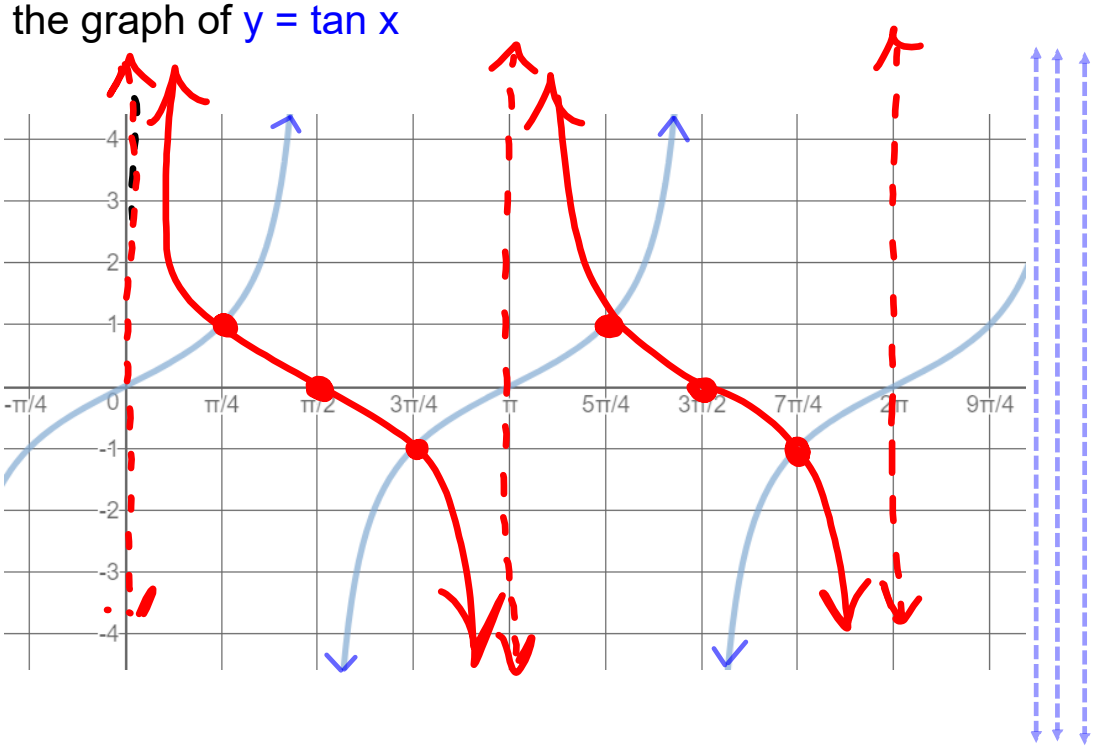
- The points at "a" and "-a" are still part of the graph.

- Has all the same properties as tangent.

Given the graph of y = tan x



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Graphing Cotangent Functions

y = *a* cot *b*x

- Period = $\frac{\pi}{b}$
- Since the period of the parent function is just π, you will need two cycles (8 critical points) to graph from 0 *to* 2π.
- The a-value stretches the points before/after the "zero" points.
- If the a-value is negative, then the graph is reflected over the x-axis.

***NOTE: First five critical locations of *y* = tan *x* follows this pattern:**

zero, + 'a', asymptote, - 'a', zero

So, y = cot x follows this pattern:

asymptote, + 'a', zero, - 'a', asymptote

Ex.1 Find all the unknowns. Then graph TWO cycles.

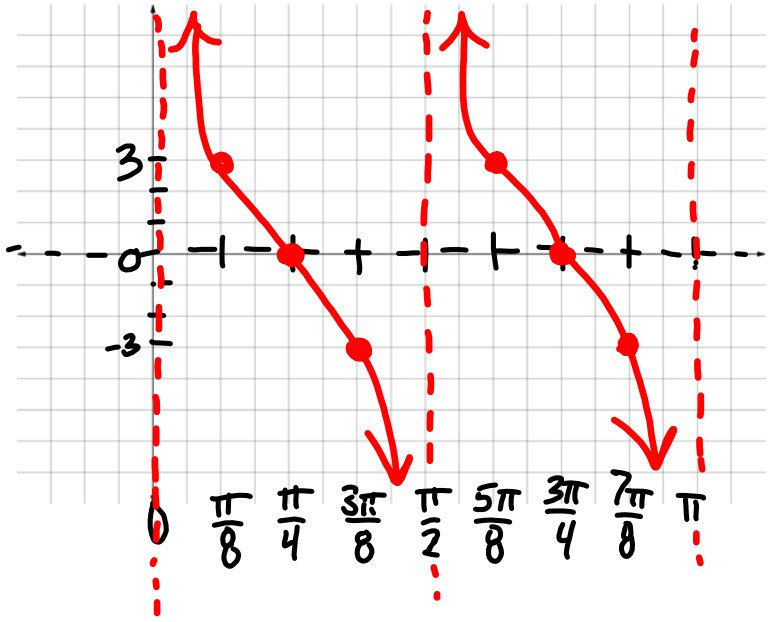
$$y = 3\cot 2\theta$$

a - value = 3

Reflection? Yes / No (circle one)

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

Midline: $y = 0$



Ex.2 Find all the unknowns. Then graph TWO cycles.

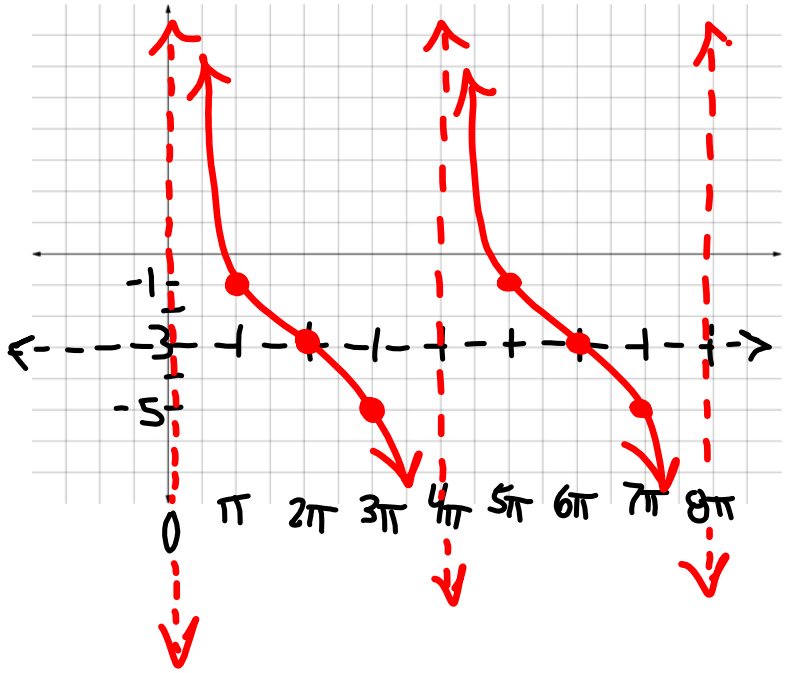
$$y = 2\cot\frac{\theta}{4} - 3$$

a - value = 2

Reflection? Yes / No (circle one)

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

Midline: $y = -3$



Ex.3 Find all the unknowns. Then graph using the entire grid.

$$y = -\cot\frac{1}{3}\left(\theta + \frac{\pi}{4}\right) + 2$$

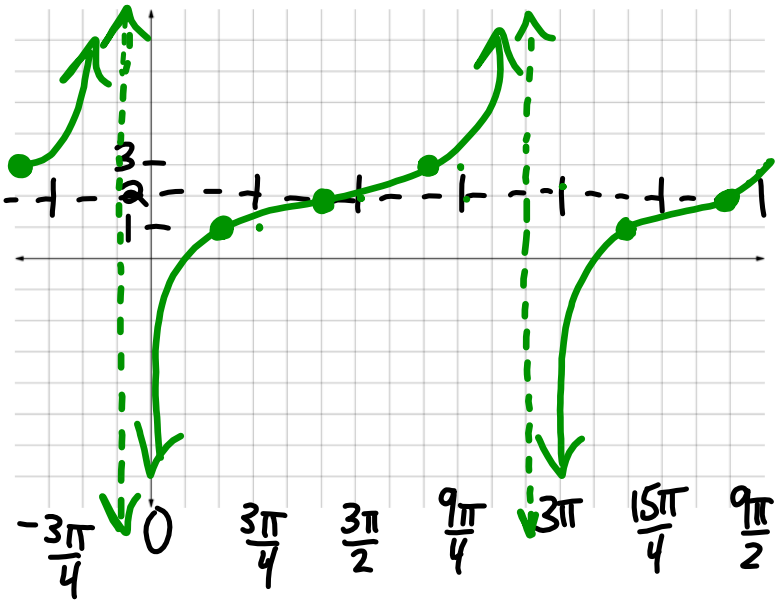
Left $\frac{\pi}{4}$ (1 unit)

a - value = -1

Reflection? Yes / No (circle one)

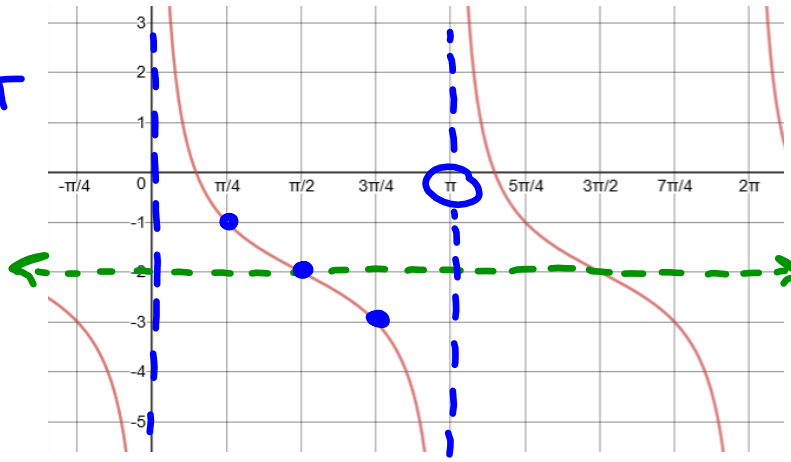
Period = $3\pi = \frac{\pi}{\frac{1}{3}}$

Midline: $y = 2$



Ex.4 Find all the unknowns. Then write the function.

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



a - value: 1 b - value: 1 midline: $y = -2$

Reflection? Yes / No

Function: $y = \cot\theta - 2$