Math Virtual Learning

Precalculus with Trigonometry

Students will graph tangent and cotangent functions and transform the functions with stretch/shrink factors and vertical shifts.

April 16, 2020

Precalculus with Trigonometry
Lesson: April 16th, 2020

Objective/Learning Target:
Students will graph tangent and cotangent functions and transform the functions with stretch/shrink factors and vertical shifts.

Let's Get Started:
Watch Video: Graphing y = tan(x)

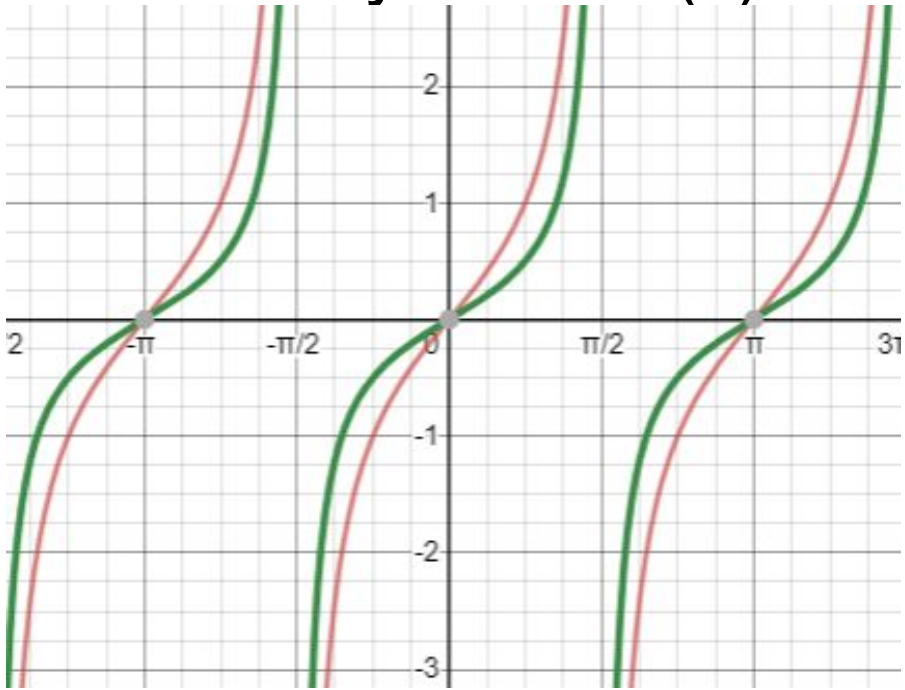
Example

In yesterday's lesson we graphed y = sin(x) and y = cos(x) as well as discovered the amplitude and midline of the functions. The tangent function can also be transformed, but due to the vast differences in y = tan(x) and y=sin(x), those transformations are labeled differently.

Go to Desmos and graph the functions y = tan(x), y = ½ tan(x). How did the ½ affect the function?

Answer to example:

Y = tan(x) is in red and y = ½ tan(x) is in green



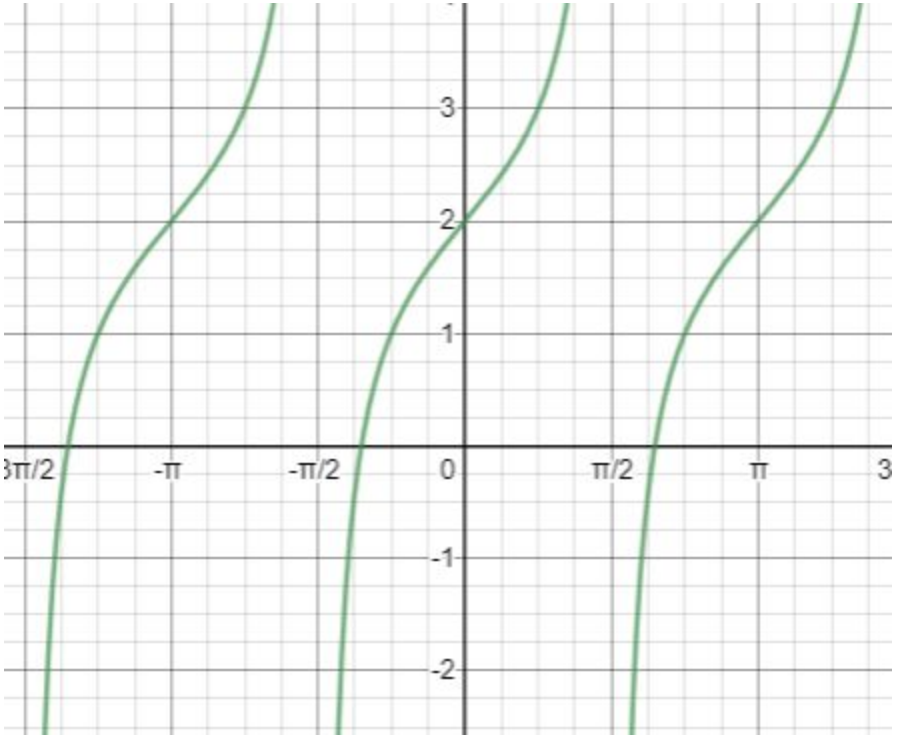
Multiplying y = tan(x) by ½ shrinks the function. Each value on y = ½ tan(x) is half as tall as the value from y = tan(x)

Example

Go to back to Desmos and graph the functions $y = \tan(x)$, $y = \tan(x) + 2$.

How did the 2 affect the function?

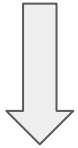
Answer to example

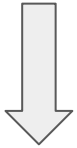


The tangent function was shifted up vertically 2 units.

STRETCH/SHRINK FACTORS AND VERTICAL SHIFT FOR TANGENT FUNCTIONS

$$y = a\tan(x) + d$$





a value determines shrink/stretch factor

a > 1 stretch factor

a < 1 shrink factor

d value determines vertical shift

d > 0 vertical shift up

d < 0 vertical shift down

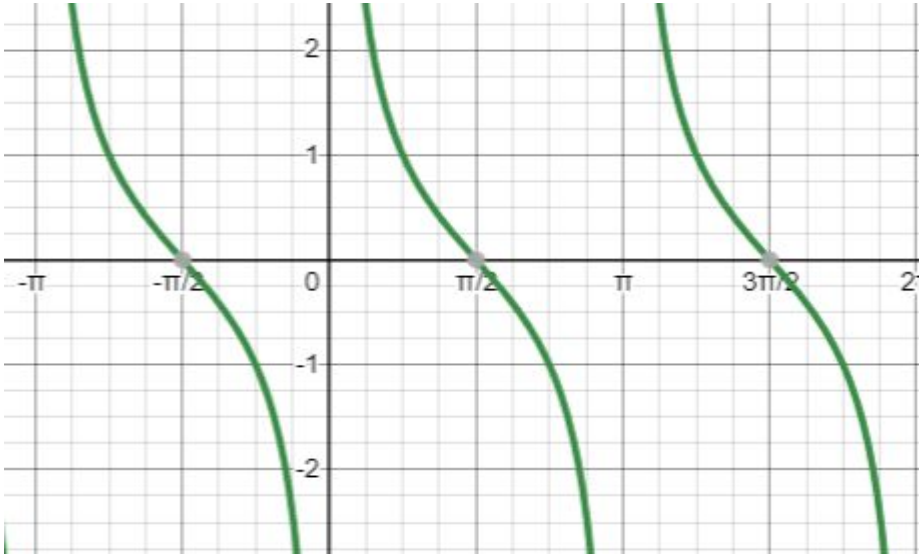
Example: y = 2tan(x) - 3 has a stretch factor of 2 and a vertical shift down 3 units.

Practice

1. After watching the video covering how to graph y = tan(x), try graphing y = cot(x) on your own. Remember, that the cotangent is the reciprocal of tangent.
2. Where are the asymptotes located on the cotangent function? Are the asymptotes for tangent the same or different for cotangent?
3. Using your knowledge of transforming tangent functions, determine the stretch/shrink factor and vertical shift of $y = \frac{1}{4} \tan(x) + 4$

Answer key

1.



2. The asymptotes are located at x = 0 and x = π This differs from the tangent function whose asymptotes are located at x = $\frac{\pi}{2}$ x = 2π

3. Shrink factor of ¼ and a vertical shift up 4 units.

Additional Practice:

Graphing Tangent and Cotangent

Answers to additional practice