

Section 4.6 Graphs of Other Trig Functions

The Tangent Function

Library of Parent Functions: Tangent Function

Recall:

The basic characteristics of the parent tangent function are summarized below.

Domain:

Range:

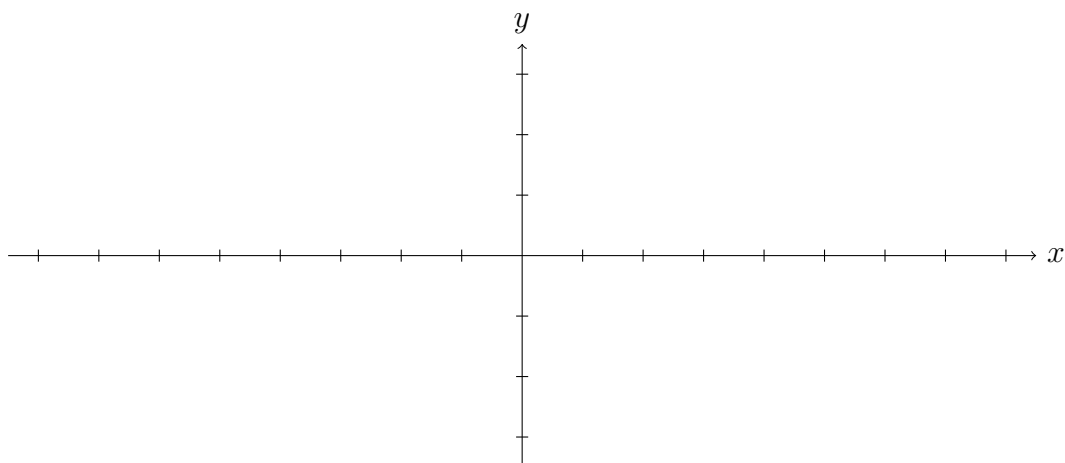
Period:

x -intercepts:

y -intercept:

Vertical asymptotes:

Odd function



Sketching the graph of $y = a \tan(bx - c)$ is similar to sketching the graph of $y = a \sin(bx - c)$ in that you locate key points that identify the intercepts and asymptotes. Two consecutive asymptotes can be found by solving the equations $bx - c = -\pi/2$ and $bx - c = \pi/2$ for x . The midpoint between two consecutive asymptotes is an x -intercept of the graph. The period of the function $y = a \tan(bx - c)$ is the distance between two consecutive asymptotes. The amplitude of a tangent function is not defined. After plotting the asymptotes and the x -intercept, plot a few additional points between the two asymptotes and sketch one cycle. Finally, sketch one or two additional cycles to the left and right.

Example 1 **Library of Parent Functions:** $f(x) = \tan x$

Sketch the graph of $y = \tan \frac{x}{2}$ by hand.

Solution:

Example 2 **Library of Parent Functions:** $f(x) = \tan x$

Sketch the graph of $y = -3 \tan 2x$ by hand.

Solution:

The Cotangent Function

Library of Parent Functions: Tangent Function

Recall:

The basic characteristics of the parent tangent function are summarized below.

Domain:

Range:

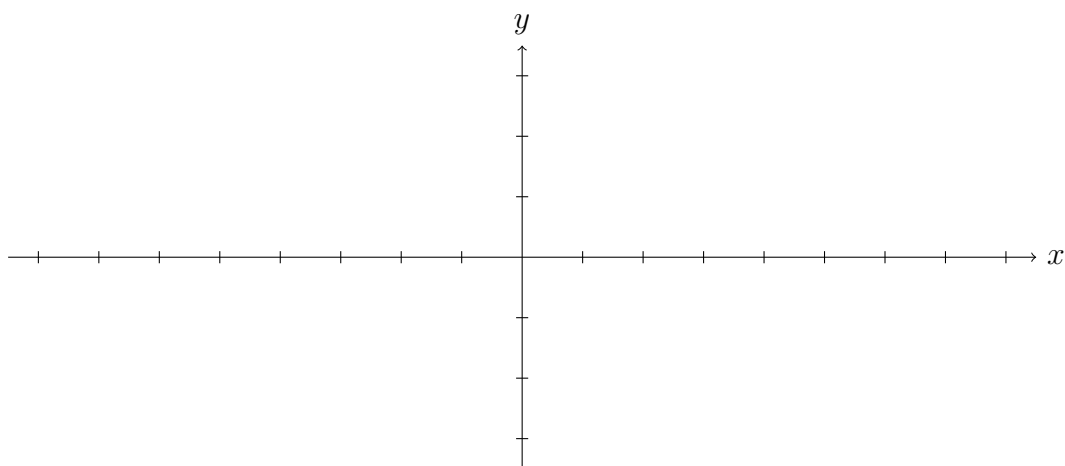
Period:

x -intercepts:

y -intercept:

Vertical asymptotes:

Odd function

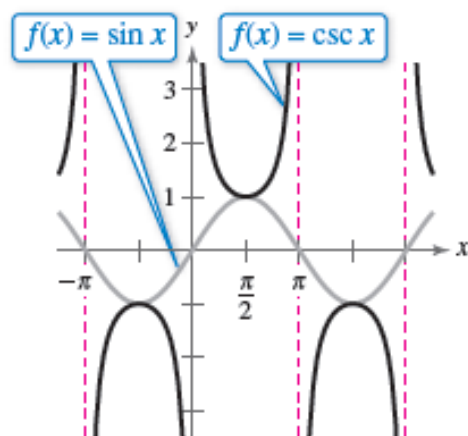


Example 3 **Library of Parent Functions:** $f(x) = \cot x$

Sketch the graph of $y = 2 \cot \frac{x}{3}$ by hand.

Solution:

Graphs of Reciprocal functions



Domain: all real numbers x , $x \neq n\pi$

Range: $(-\infty, -1] \cup [1, \infty)$

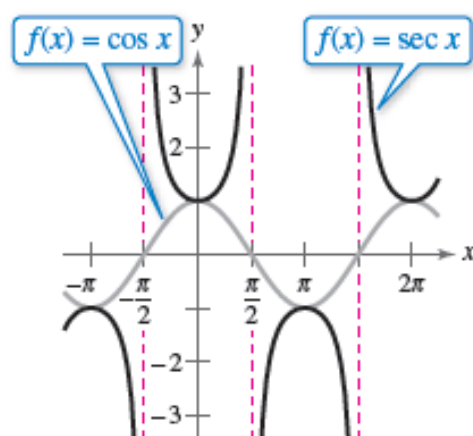
Period: 2π

No intercepts

Vertical asymptotes: $x = n\pi$

Odd function

Origin symmetry



Domain: all real numbers x , $x \neq \frac{\pi}{2} + n\pi$

Range: $(-\infty, -1] \cup [1, \infty)$

Period: 2π

y-intercept: $(0, 1)$

Vertical asymptotes: $x = \frac{\pi}{2} + n\pi$

Even function

y-axis symmetry