

Section 1.6 Graphs of Other Trigonometric Functions

Objective: In this lesson you learned how to sketch the graphs of other trigonometric functions.

Course Number

Instructor

Date

Important Vocabulary

Define each term or concept.

Damping factor When a trigonometric function is multiplied by another function, this other function is called the damping factor.

I. Graph of the Tangent Function (Pages 175–176)

Because the tangent function is odd, the graph of $y = \tan x$ is symmetric with respect to the origin. The period of the tangent function is p . On the interval $[0, p]$, the tangent function is undefined, and thus has a vertical asymptote, at $x = \underline{p/2}$. The domain of the tangent function is all $x \neq p/2 + np$, and the range of the tangent function is $(-\infty, \infty)$.

What you should learn

How to sketch the graphs of tangent functions

Describe how to sketch the graph of a function of the form $y = a \tan(bx - c)$.

Begin by locating key points that identify intercepts and asymptotes. Two consecutive asymptotes can be found by solving the equations $bx - c = -p/2$ and $bx - c = p/2$. The midpoint between two consecutive asymptotes is an x -intercept of the graph. The period is the distance between two consecutive asymptotes. After plotting the asymptotes and the x -intercept, plot a few additional points between the two asymptotes to sketch one cycle. Finally, sketch one or two additional cycles to the left and right.

II. Graph of the Cotangent Function (Page 177)

The graph of $y = \cot x$ is symmetric with respect to the origin. The period of the cotangent function is p . On the interval $(0, p]$, the cotangent function is undefined, and thus has a vertical asymptote, at $x = \underline{p}$.

What you should learn

How to sketch the graphs of cotangent functions

The domain of the cotangent function is all $x \neq np$,
and the range of the cotangent function is $(-\infty, \infty)$.

III. Graphs of the Reciprocal Functions (Pages 178–179)

At a given value of x , the y -coordinate of $\csc x$ is the reciprocal of the y -coordinate of $\sin x$.

The graph of $y = \csc x$ is symmetric with respect to the origin. The period of the cosecant function is $2p$. On the interval $(0, p]$, the cosecant function is undefined, and thus has a vertical asymptote, at $x =$ p .

The domain of the cosecant function is all $x \neq np$,
and the range of the cosecant function is $(-\infty, -1]$ and $[1, \infty)$.

At a given value of x , the y -coordinate of $\sec x$ is the reciprocal of the y -coordinate of $\cos x$.

The graph of $y = \sec x$ is symmetric with respect to the y -axis. The period of the secant function is $2p$.

On the interval $[0, p]$, the secant function is undefined, and thus has a vertical asymptote, at $x =$ $p/2$. The domain of the secant function is all $x \neq p/2 + np$, and the range of the secant function is $(-\infty, -1]$ and $[1, \infty)$.

To sketch the graph of a secant or cosecant function, . . .

you should first make a sketch of its reciprocal function. Then take reciprocals of the y -coordinates to obtain points on the graph of the secant or cosecant function. The x -intercepts of the reciprocal function become the vertical asymptotes of the secant or cosecant function.

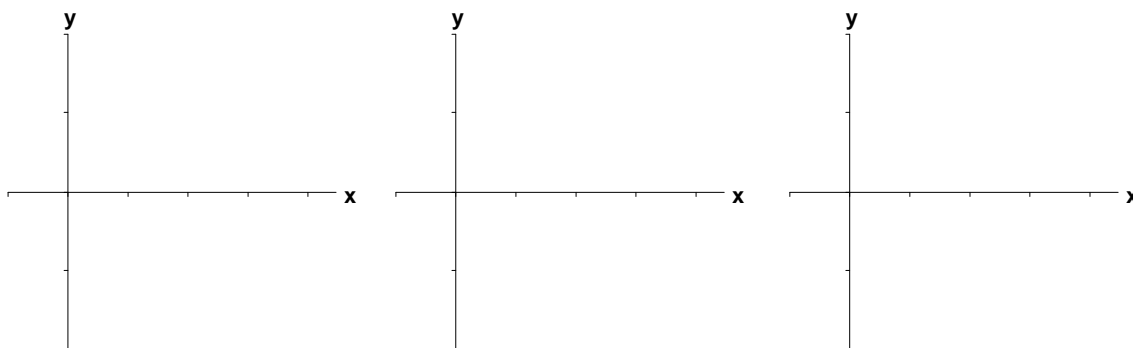
What you should learn
How to sketch the graphs of secant and cosecant functions

IV. Damped Trigonometric Graphs (Pages 180–181)

Explain how to sketch the graph of the damped trigonometric function $y = f(x)\cos x$, where $f(x)$ is the damping factor.

What you should learn
How to sketch the graphs of damped trigonometric functions

Answers will vary. For instance, sketch $f(x)$ and $-f(x)$ as guides. Then sketch the graph of $y = \cos x$ “between” these guides so that the graph touches the guides at all x -values that would normally be x -intercepts of $y = \cos x$.

Additional notes**Homework Assignment**

Page(s)

Exercises