

*RECIPROCAL*

Note: Be sure that your calculator is in radian mode.

We now introduce the remaining three trigonometric functions. Each one is the reciprocal of a function we have already studied.

$$\text{secant of } \theta = \sec(\theta) = \frac{1}{\cos(\theta)} \quad \text{cosecant of } \theta = \csc(\theta) = \frac{1}{\sin(\theta)}$$

$$\text{cotangent of } \theta = \cot(\theta) = \frac{1}{\tan(\theta)} = \frac{\cos(\theta)}{\sin(\theta)}$$

1. Let  $f(x) = \sec(x)$ . Then think back to your work with reciprocal functions to help answer the following questions.

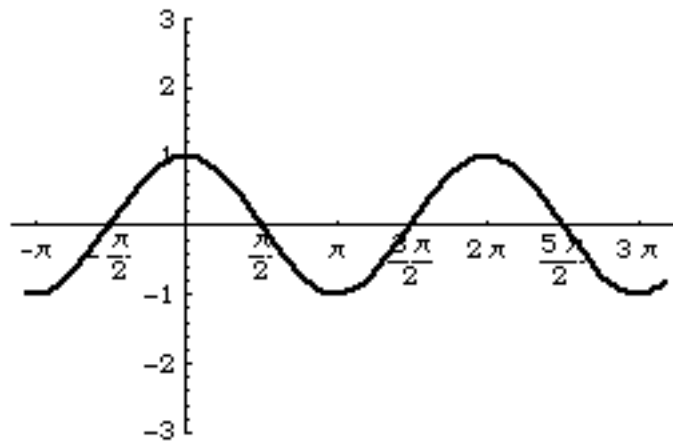
a. When  $y = \cos(x) = 0$ , what does this tell you about  $y = \sec(x) = \frac{1}{\cos(x)}$ ?

- b. What  $y$  values are the same as their reciprocal values? \_\_\_\_\_

State three values of  $x$  where  $\sec(x) = \cos(x)$ . \_\_\_\_\_

- c. When  $y = \cos(x) > 0$ , what may be said about  $y = \sec(x)$ ?

- d. The graph of  $y = \cos(\theta)$  is given. Sketch the graph of  $y = \sec(\theta)$  on the same axes.



- e. Thinking about the cosine function, find the following for the secant function.

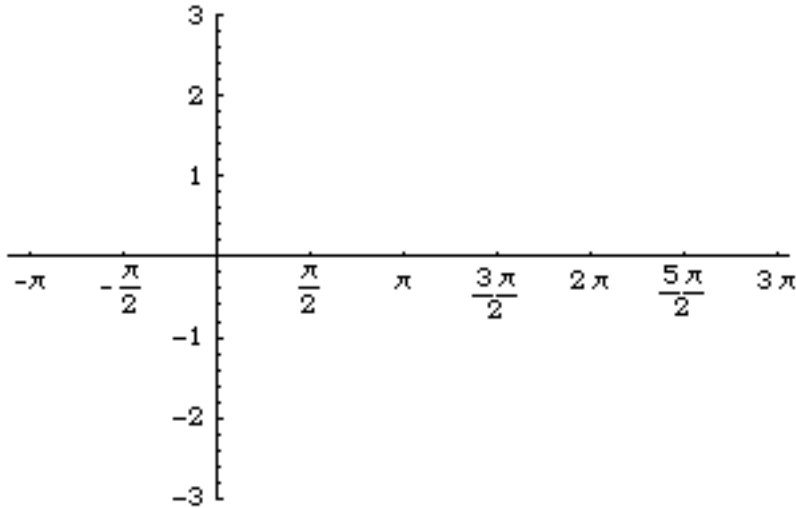
Domain:

Range:

Period:

2. Let  $f(x) = \csc(x)$ .

- a. Think about zeros and other important points to sketch the graphs of both  $y = \sin(x)$  and the reciprocal function  $y = \csc(x)$ .



- b. Thinking about the sine function, find the following for the cosecant function.

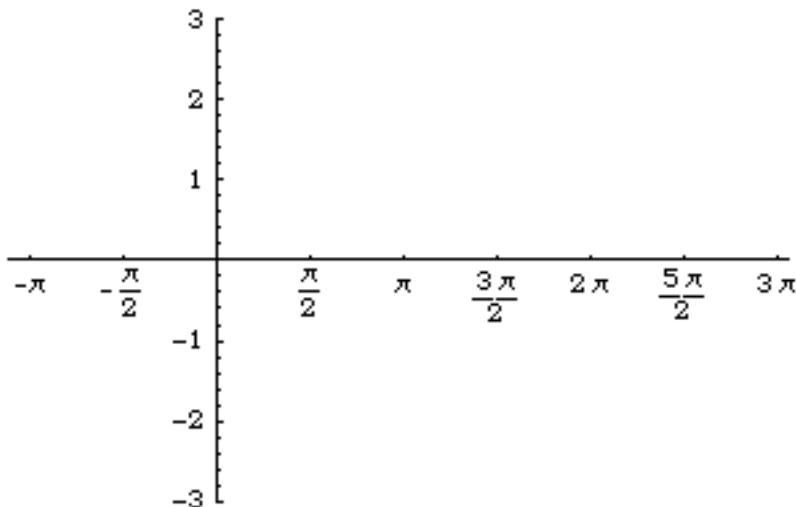
Domain:

Range:

Period:

3. Let  $f(x) = \cot(x)$ .

- a. Sketch the graph of  $f(x) = \cot(x)$ .



- b. Thinking about the tangent function, find the following for the cotangent function.

Domain:

Range:

Period: