

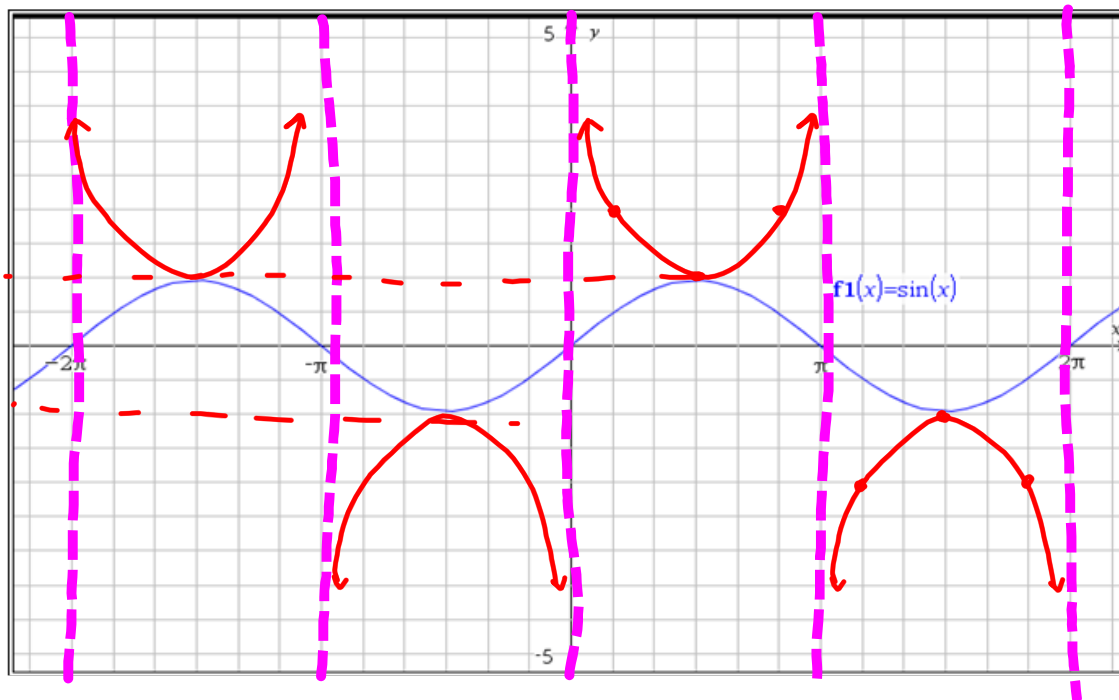
Name \_\_\_\_\_

**Exploring Cosecant and Secant Graphs**

1. Using your knowledge of the Sine function and its relation to the Cosecant function, complete the following chart for  $f(x) = \csc(x)$ .

$x$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	$\pi$
<b><u><math>\sin(x)</math></u></b> (exact value)	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
Decimal approximation of $\sin(x)$	0	0.5	0.707	0.866	1	0.866	0.707	0.5	0
<b><u><math>\csc(x)</math></u></b> (exact value)	undef.	2	$\sqrt{2}$	$\frac{2\sqrt{3}}{3}$	1	$\frac{2\sqrt{3}}{3}$	$\sqrt{2}$	2	undef.
<del>Decimal approximation of <math>\csc(x)</math></del>	undef.	2	1.414	1.156	1	1.156	1.414	2	undef.
$x$	$\frac{7\pi}{6}$	$\frac{5\pi}{4}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{7\pi}{4}$	$\frac{11\pi}{6}$	$2\pi$	
<b><u><math>\sin(x)</math></u></b> (exact value)	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0	
Decimal approximation of $\sin(x)$	-0.5	-0.707	-0.866	-1	-0.866	-0.707	-0.5	0	
<b><u><math>\csc(x)</math></u></b> (exact value)	-2	$-\sqrt{2}$	$-\frac{2\sqrt{3}}{3}$	-1	$-\frac{2\sqrt{3}}{3}$	$-\sqrt{2}$	-2	undef.	
<del>Decimal approximation of <math>\csc(x)</math></del>	-2	-1.414	-1.156	-1	-1.156	-1.414	-2	undef.	

2. Use your decimal approximations to sketch the graph of  $f(x) = \csc(x)$  on the coordinate plane below.



3. Use your graph to answer the following questions about the function  $f(x) = \csc(x)$ :

a. What is the period of the function?

$2\pi$

b. What are the domain and range?

$D: (-\infty, \infty) \ x \neq n\pi$

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

c. What is the y-intercept?

None

d. What are the x-intercepts?

None

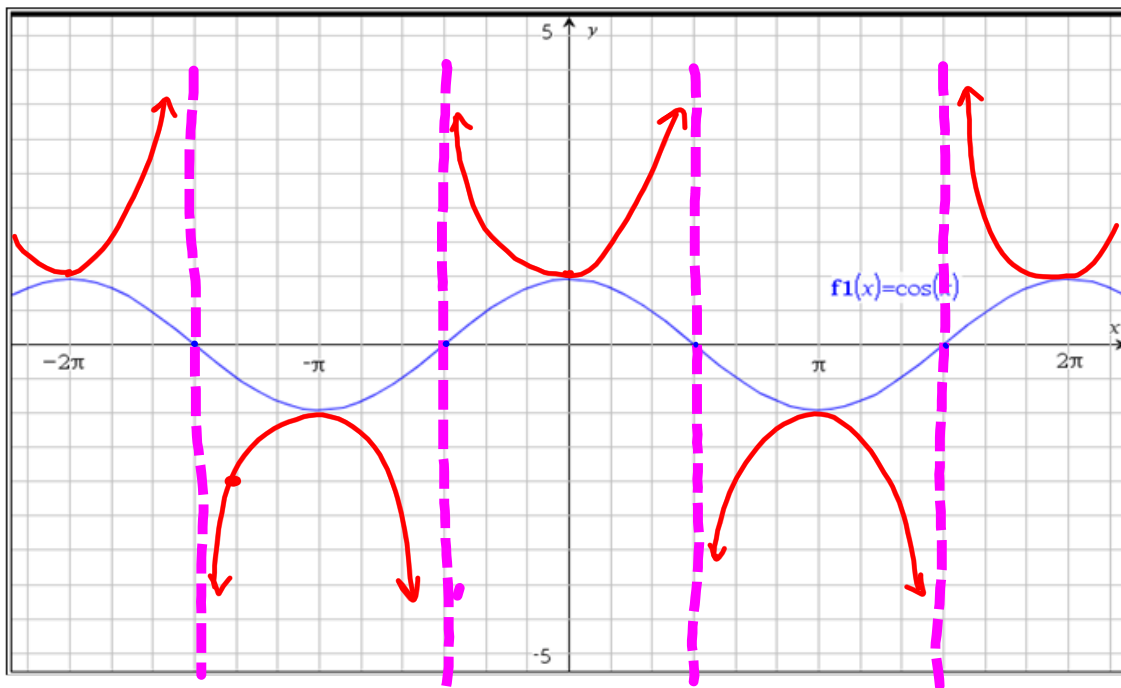
e. What are the maximum and minimum values?

Local      Local  
 $-1$        $1$

4. Using your knowledge of the Cosine function and its relation to the Secant function, complete the following chart for  $f(x) = \sec(x)$ .

$x$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	$\pi$
<b><math>\cos(x)</math> (exact value)</b>	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1
Decimal approximation of $\cos(x)$	1	0.866	0.707	0.5	0	-0.5	-0.707	-0.866	-1
<b><math>\sec(x)</math> (exact value)</b>	1	$\frac{2\sqrt{3}}{3}$	$\sqrt{2}$	2	undef.	-2	$-\sqrt{2}$	$-\frac{2\sqrt{3}}{3}$	-1
Decimal approximation of $\sec(x)$	1	1.156	1.414	2	undef.	-2	-1.414	-1.156	-1
$x$	$\frac{7\pi}{6}$	$\frac{5\pi}{4}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{7\pi}{4}$	$\frac{11\pi}{6}$	$2\pi$	
<b><math>\cos(x)</math> (exact value)</b>	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	
Decimal approximation of $\cos(x)$	-0.866	-0.707	-0.5	0	0.5	0.707	0.866	1	
<b><math>\sec(x)</math> (exact value)</b>	$-\frac{2\sqrt{3}}{3}$	$-\sqrt{2}$	-2	undef.	2	$\sqrt{2}$	$\frac{2\sqrt{3}}{3}$	1	
Decimal approximation of $\sec(x)$	-1.156	-1.414	-2	undef.	2	1.414	1.156	1	

5. Use your decimal approximations to sketch the graph of  $f(x) = \sec(x)$  on the coordinate plane below.



6. Use your graph to answer the following questions about the function  $f(x) = \sec(x)$ :

- a. What is the period of the function?
- b. What are the domain and range?
- c. What is the y-intercept?
- d. What are the x-intercepts?
- e. What are the maximum and minimum values?

7. How are the graphs of  $\csc(x)$  and  $\sec(x)$  similar? How are they different?