

Section 4.6
part 1

Graph of $\sec x$ and $\csc x$

Objective:

Given an equation of a cosecant x and secant x function students will be able to graph them and find the domain and range.

Study Problems

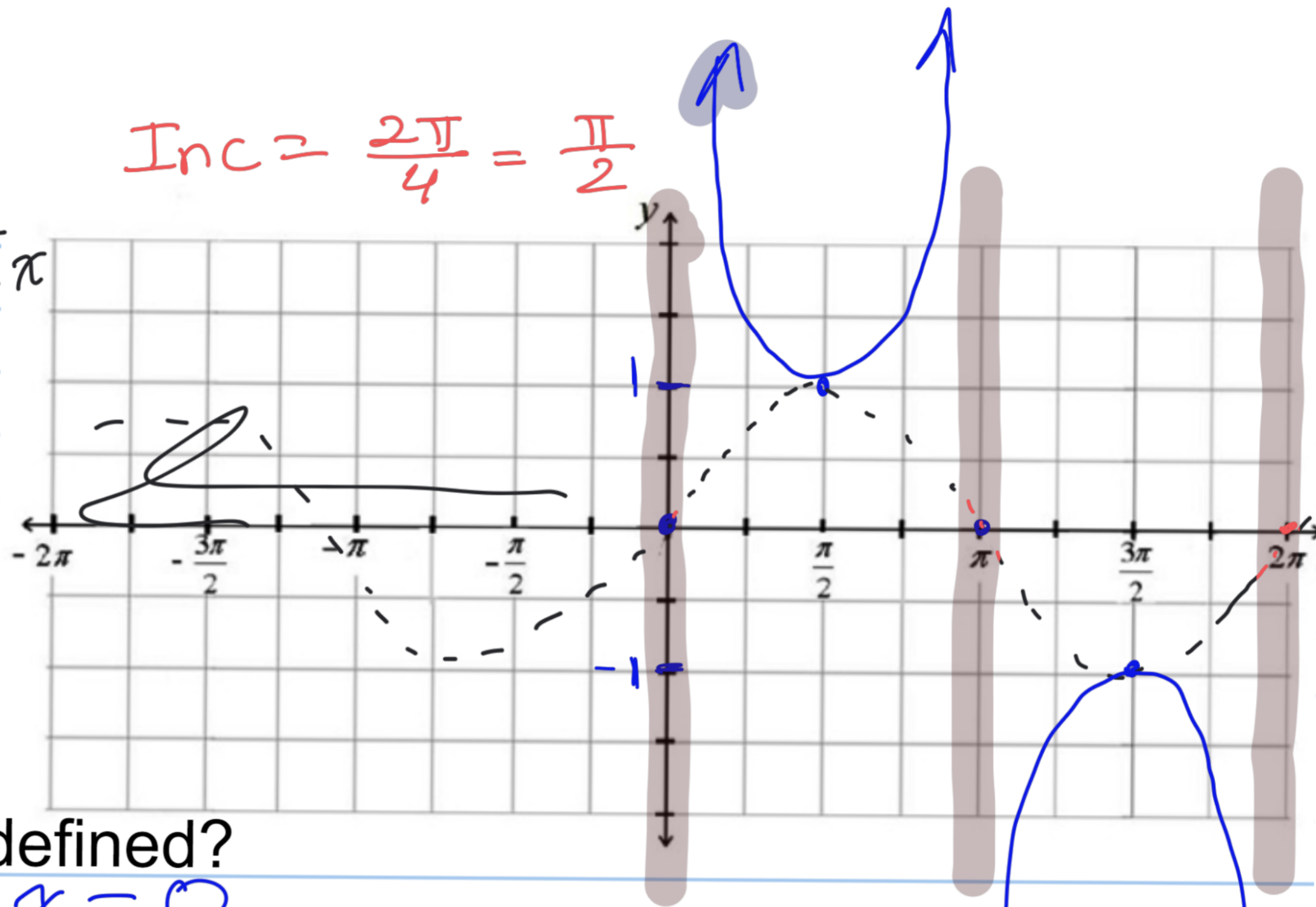
Page 341 #17-19, 27, 30

Graph

$$y = \csc x = \frac{1}{\sin x}$$

x	y
0	0
$\frac{\pi}{2}$	1
π	0
$\frac{3\pi}{2}$	-1
2π	0

$$\text{Inc} = \frac{2\pi}{4} = \frac{\pi}{2}$$



Where will it be undefined?

where $\sin x = 0$

Where will it have vertical asymptotes?

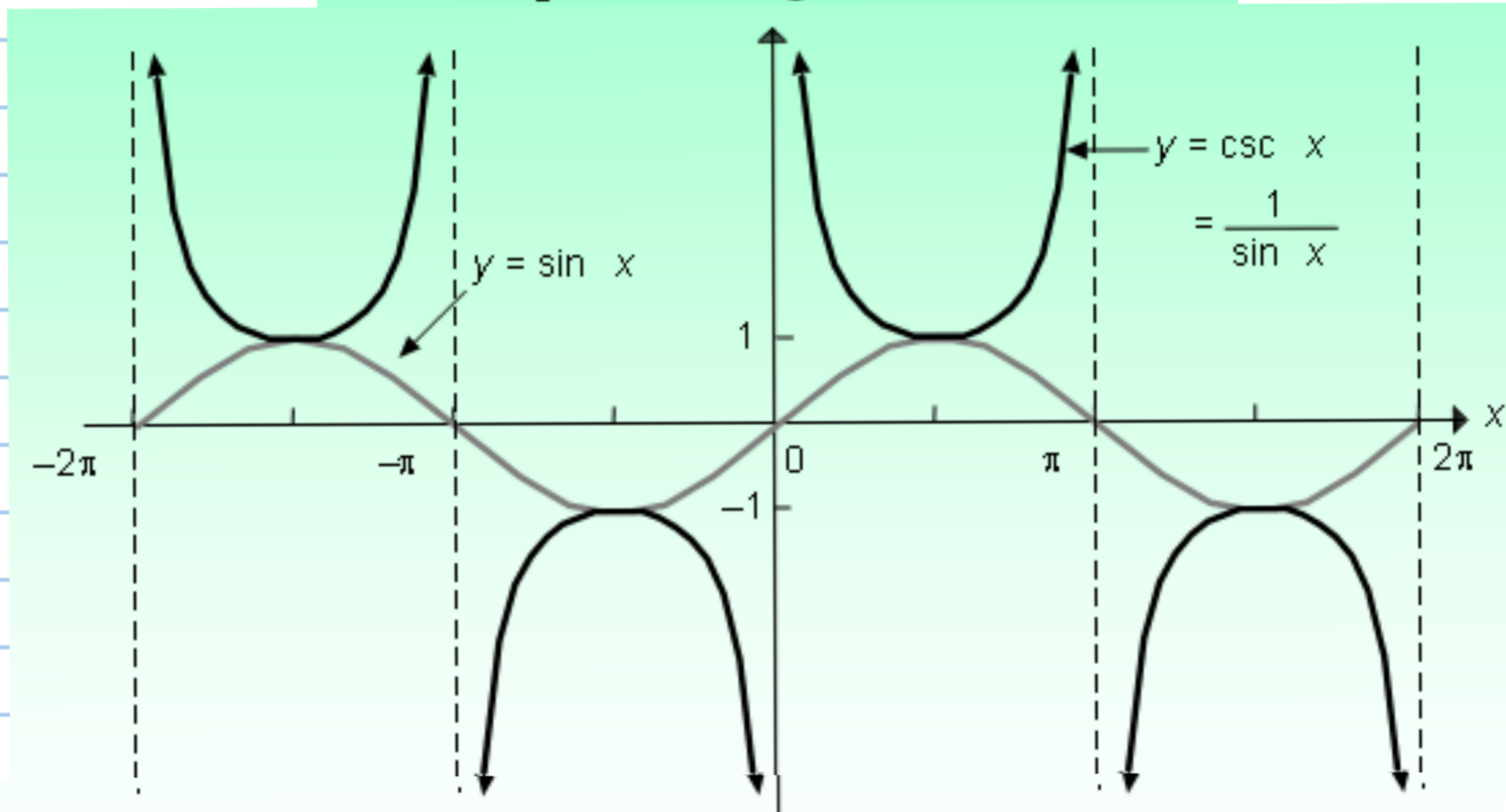
$0, \pi, 2\pi, 3\pi, \dots$

Domain $\{x \in \mathbb{R} \mid x \neq k\pi, \text{ where } k \in \mathbb{Z}\}$

Range $\{y \in \mathbb{R} \mid y \geq 1 \text{ or } y \leq -1\}$

Integers

Graph of $y = \csc x$



Period: 2π

Domain: All real numbers except $k\pi$, k an integer

Symmetric with respect to the origin

Range: All real numbers y such that $y \leq -1$ or $y \geq 1$

Discontinuous at $x = k\pi$, k an integer

5-8-60

Example

Graph

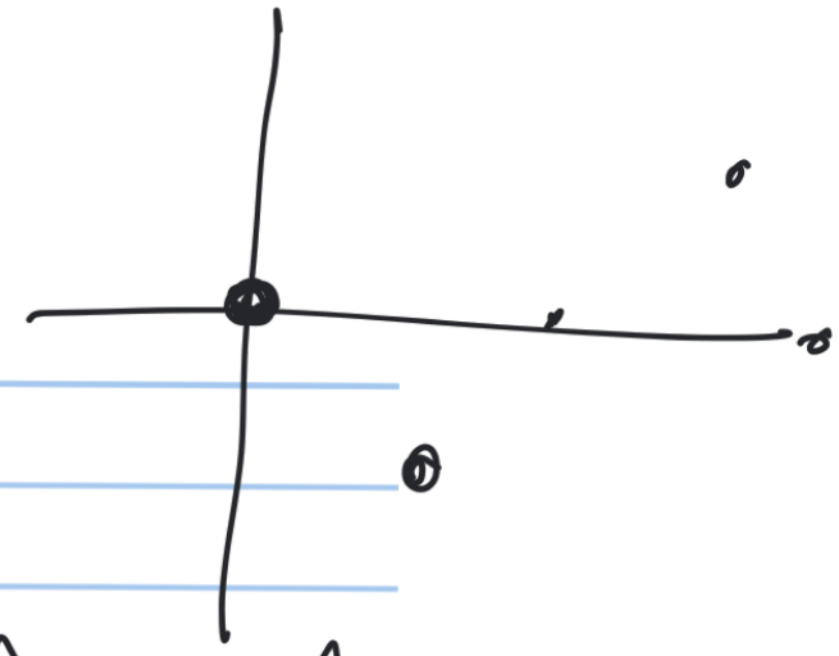
$$y = -\text{csc}\left(2x - \frac{\pi}{4}\right)$$

~~$y = -\text{csc}\left(2\left(x - \frac{\pi}{8}\right)\right)$~~

$+ \pi/8$

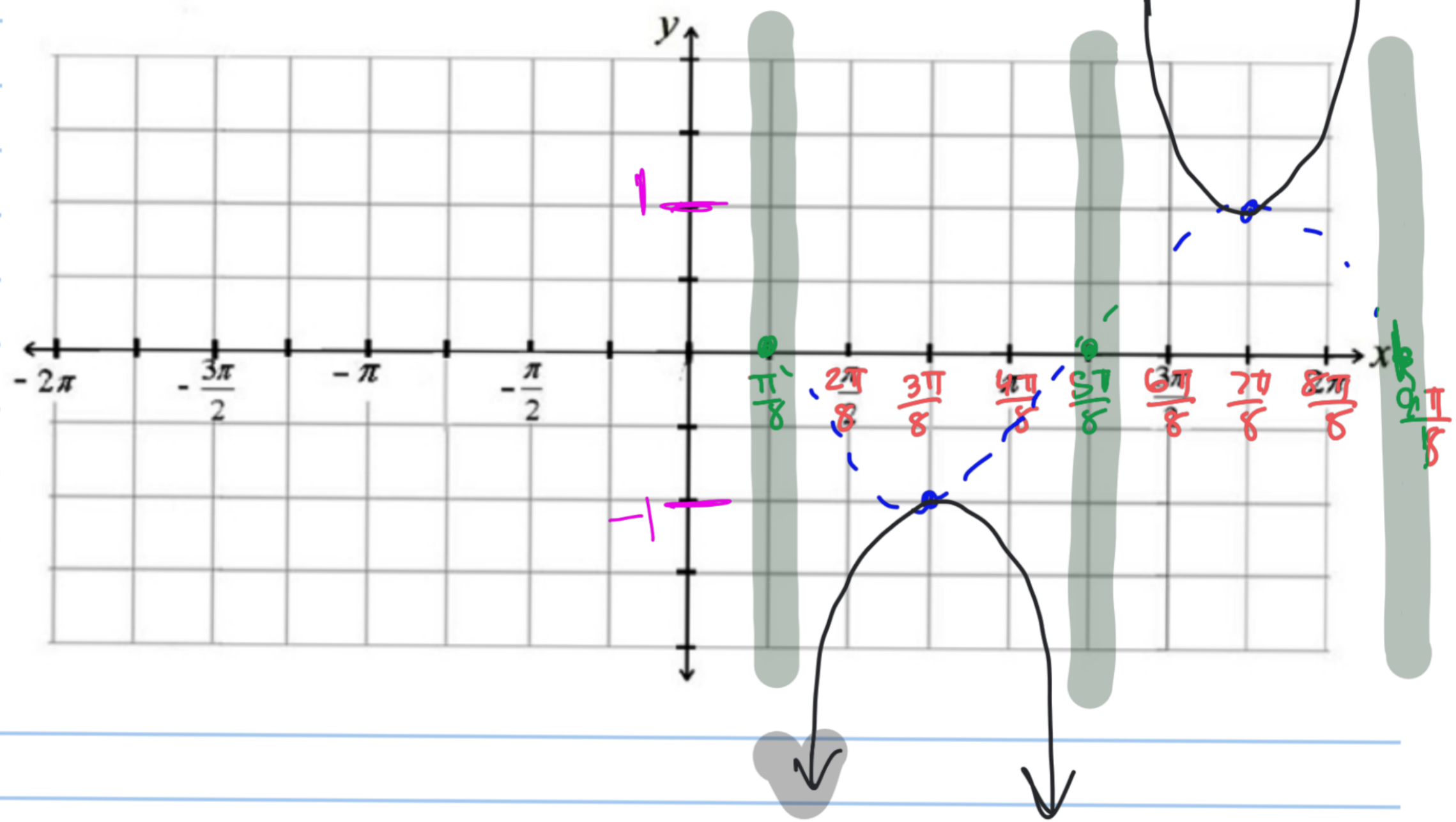
vertical shift: \emptyset
 amplitude: 1
 phase shift: $\pi/8$
 period: π

$\frac{2\pi}{2} = \pi$
 $\frac{\pi}{4}$



x	New
$\pi/8$	$\pi/8$
$3\pi/8$	$3\pi/8$
$5\pi/8$	$5\pi/8$
$7\pi/8$	$7\pi/8$
$9\pi/8$	$9\pi/8$

$\frac{2\pi}{8} = \pi/4$
 $\frac{4\pi}{8} = \pi/2$
 $\frac{6\pi}{8} = \frac{3\pi}{4}$
 $\frac{8\pi}{8} = \pi$



Example

Graph

$$y = -\csc(2x) + 3$$

vertical shift: 3
amplitude: 1
phase shift: 0
period: π

Inc: $\pi/4$

max = 6
min = 0

x	
0	3
$\pi/4$	2
$\pi/2$	3
$3\pi/4$	4
π	3

