Section 4.6

Graph of Tangent and Cotangent

Objective: Given an equation of a tangent function students will be able to graph the tangent function on a coordinate plane.

Study Problems

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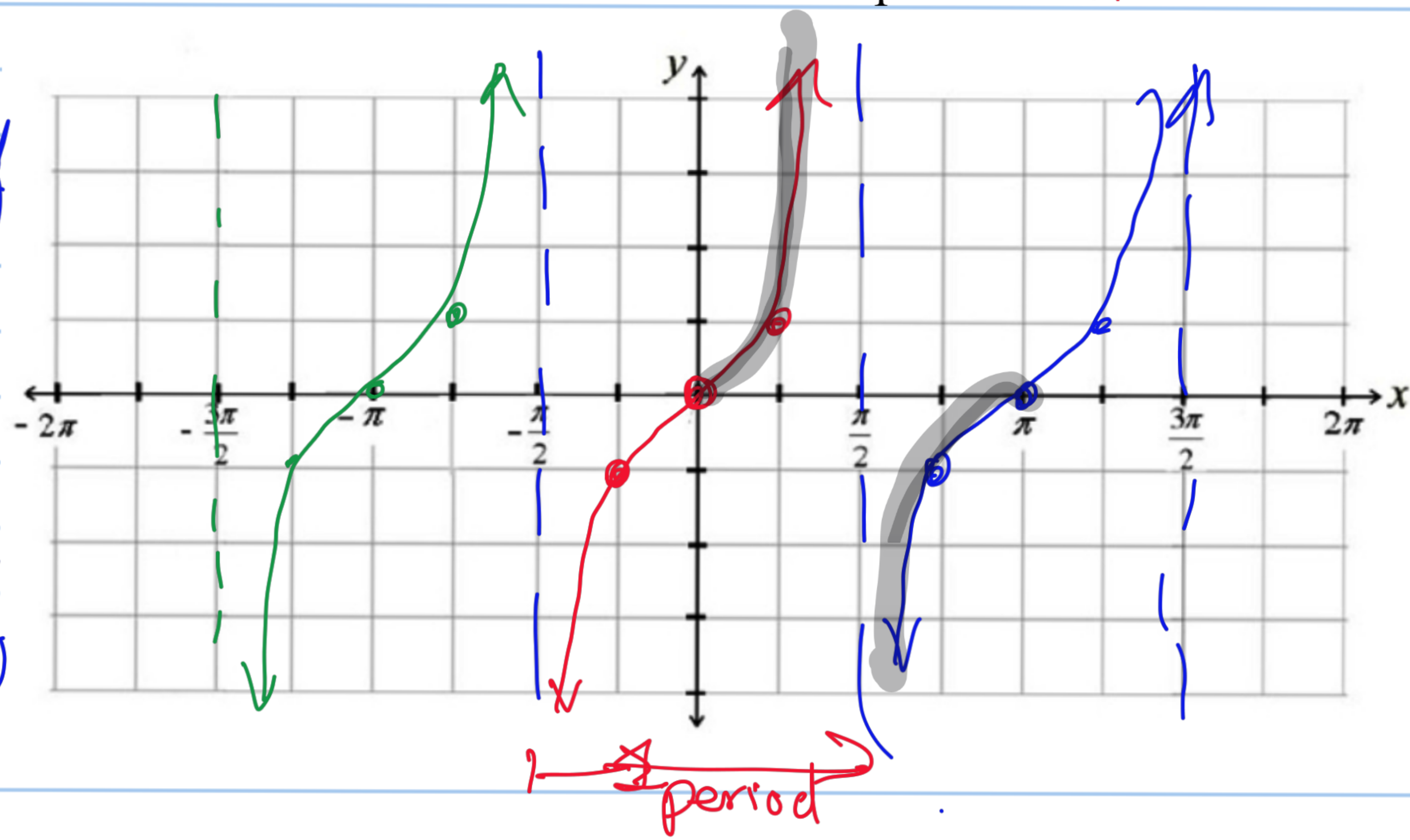
Graph

$$y = \tan x = \frac{\sin x}{\cos x}$$

vertical shift: none
amplitude: 1
phase shift: none
period: π

Inc: $\frac{\pi}{4}$

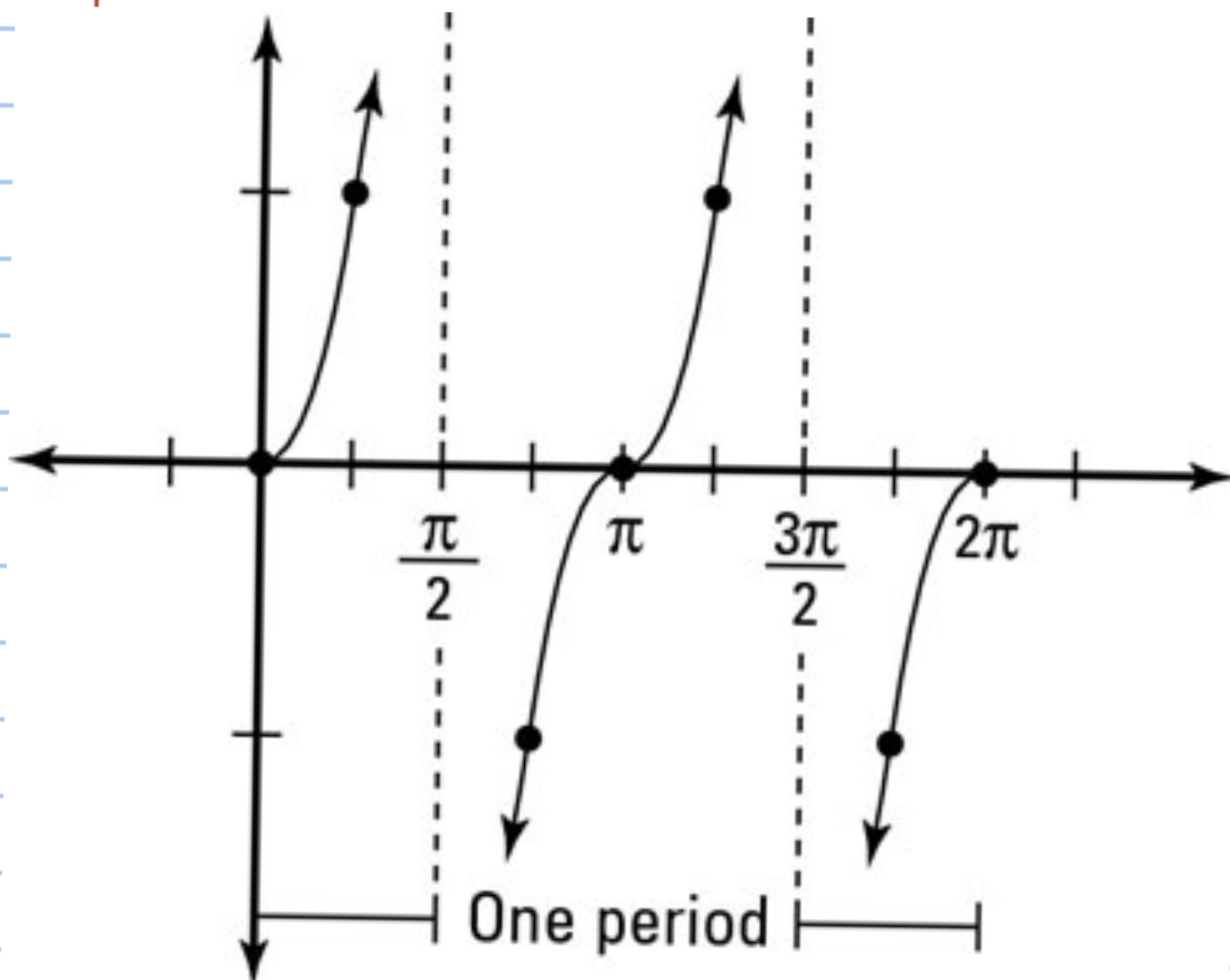
x	
$-\pi/2$	Undf
$-\pi/4$	-1
0	0
$\pi/4$	1
$\pi/2$	undf

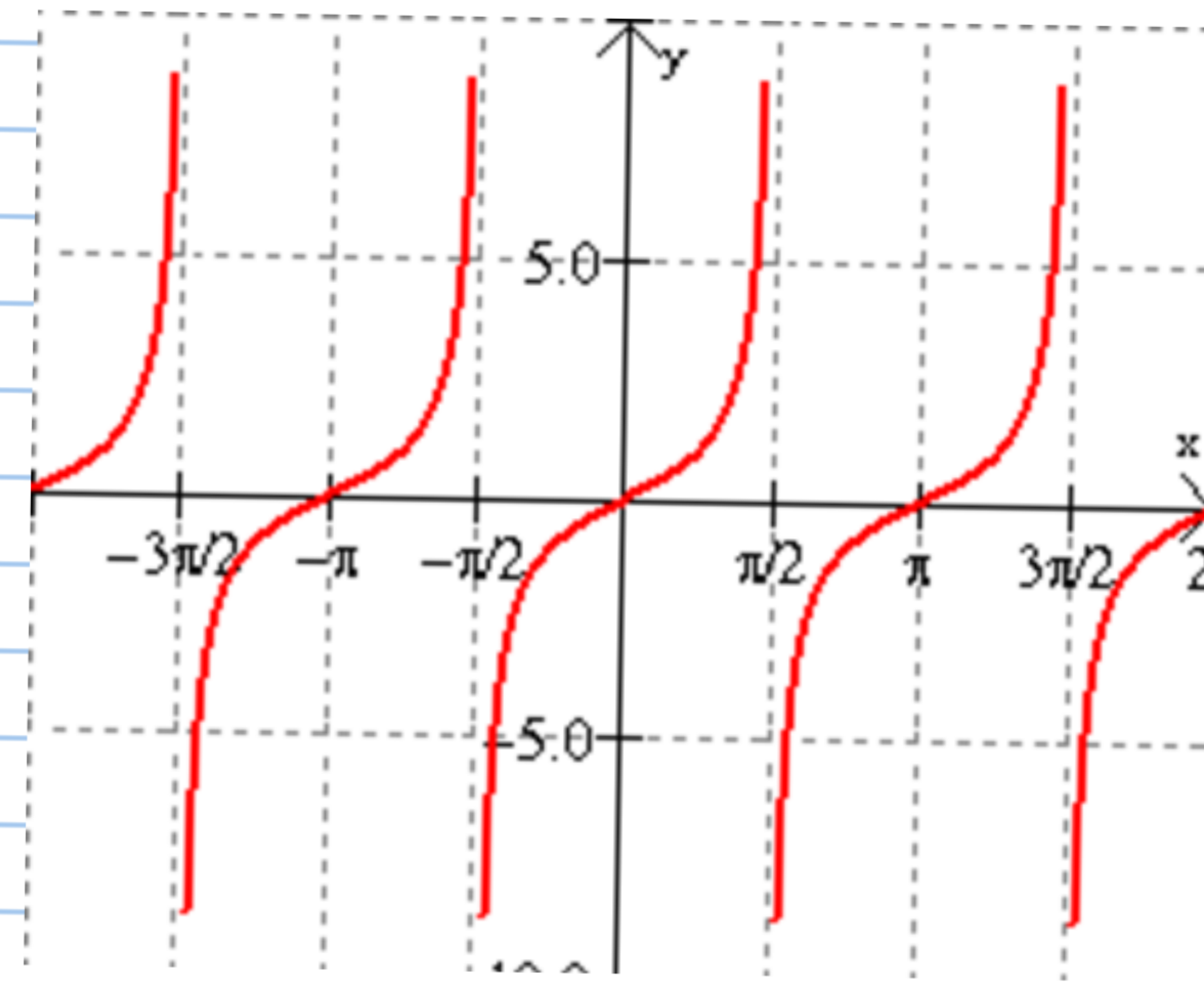


D: $\{x \in \mathbb{R} \mid x \neq \frac{k\pi}{2}$ where k an odd integer$\}$

R: $\{y \in \mathbb{R}\}$

$y = \tan x$





Characteristics of the Tangent Function

1. The domain is the set of all real numbers, except odd multiples of $\pi/2$.

2. The range consists of all real numbers.

3. The tangent function is an odd function (symmetric with respect to the origin)

4. The tangent function is periodic with period π.

5. The y-intercept is $y = 0$ and the x-intercepts are $\ldots -2\pi,\ -\pi,\ 0,\ \pi, 2\pi \ldots k\pi \ldots$

6. The vertical asymptotes occur at $x =$ $\ldots -3\pi/2, -\pi/2,\ \pi/2,\ 3\pi/2 \ldots$

Sketching the graph of y=atan(bx-c) is similar to sketching y=asin(bx-c) in that you locate key points that identify the intercepts and asymptotes, but the period of tanx is pi.

Pattern

	Tan	Cot
A>0	ALMHA	AHMLA
A<0	AHMLA	ALMHA

* Change sign, switch H & L

Example

Graph $y = 2\tan 2x$

vertical shift: none

amplitude: 2

phase shift: none

period: $\frac{\pi}{2}$

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

$\frac{\pi}{2} \cdot \frac{1}{4} = \boxed{\frac{\pi}{8}}$

x	
$-\pi/4$	undf
$-\pi/8$	-2
0	0
$\pi/8$	2
$\pi/4$	undf