

Ex: Sketch

$$y = -2 \sin\left(3\left(x + \frac{\pi}{4}\right) - 7\right)$$

(1)

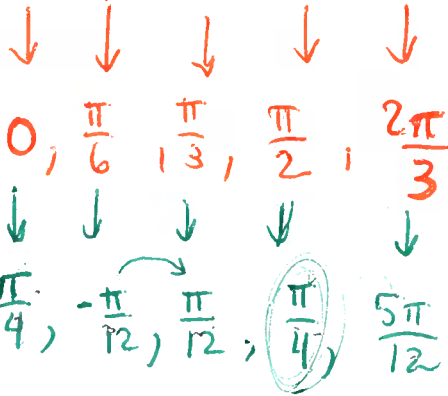
V. refl and v. str.
 ACTION: mult
 y-val by -2
 3rd

h. compression
 divides x-values
 by 3
 1st

h. shift
 left \sim
 subtracts $\frac{\pi}{4}$
 from x-values
 2nd

v. shift down
 subtracts 7
 from y-values
 4th

Anchor pts: $0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}, 2\pi$



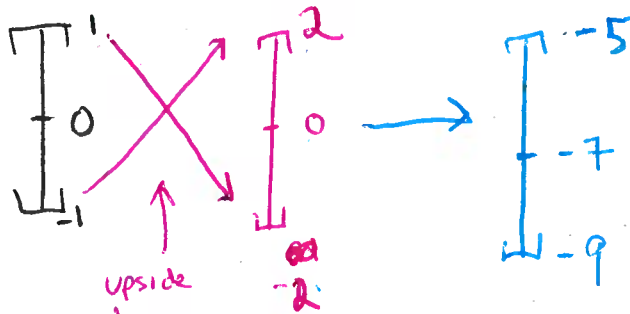
$$\frac{\pi}{6} - \frac{\pi}{4} = \frac{2\pi}{12} - \frac{3\pi}{12}$$


$$\frac{\pi}{3} - \frac{\pi}{4} = \frac{4\pi}{12} - \frac{3\pi}{12}$$

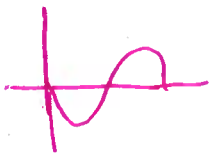
$$\frac{\pi}{2} - \frac{\pi}{4} = \frac{2\pi}{4} - \frac{\pi}{4} = \frac{\pi}{4}$$

$$\frac{2\pi}{3} - \frac{\pi}{4} = \frac{8\pi}{12} - \frac{3\pi}{12}$$

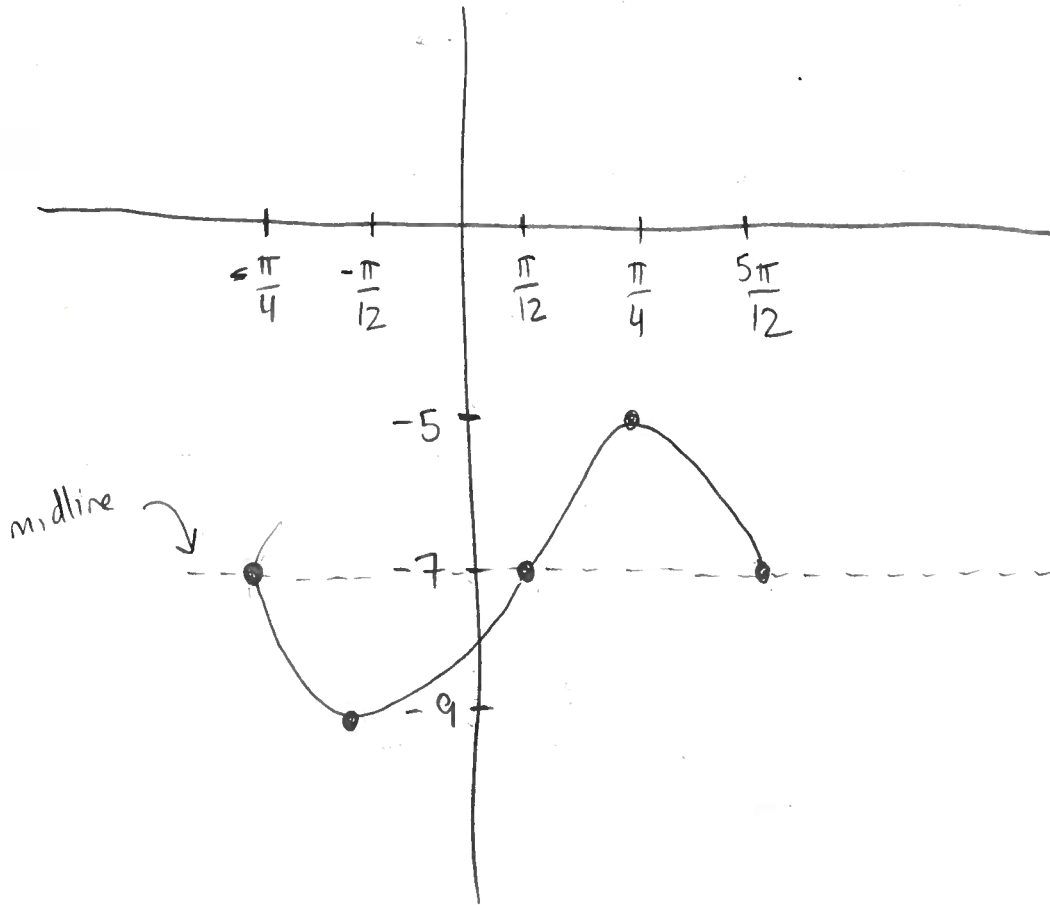
$$-\frac{\pi}{4} = -\frac{3\pi}{12}$$



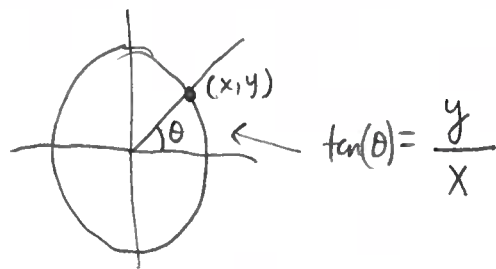
instead of

 we will use



2



Graph $y = \tan(x) = \frac{\sin(x)}{\cos(x)}$

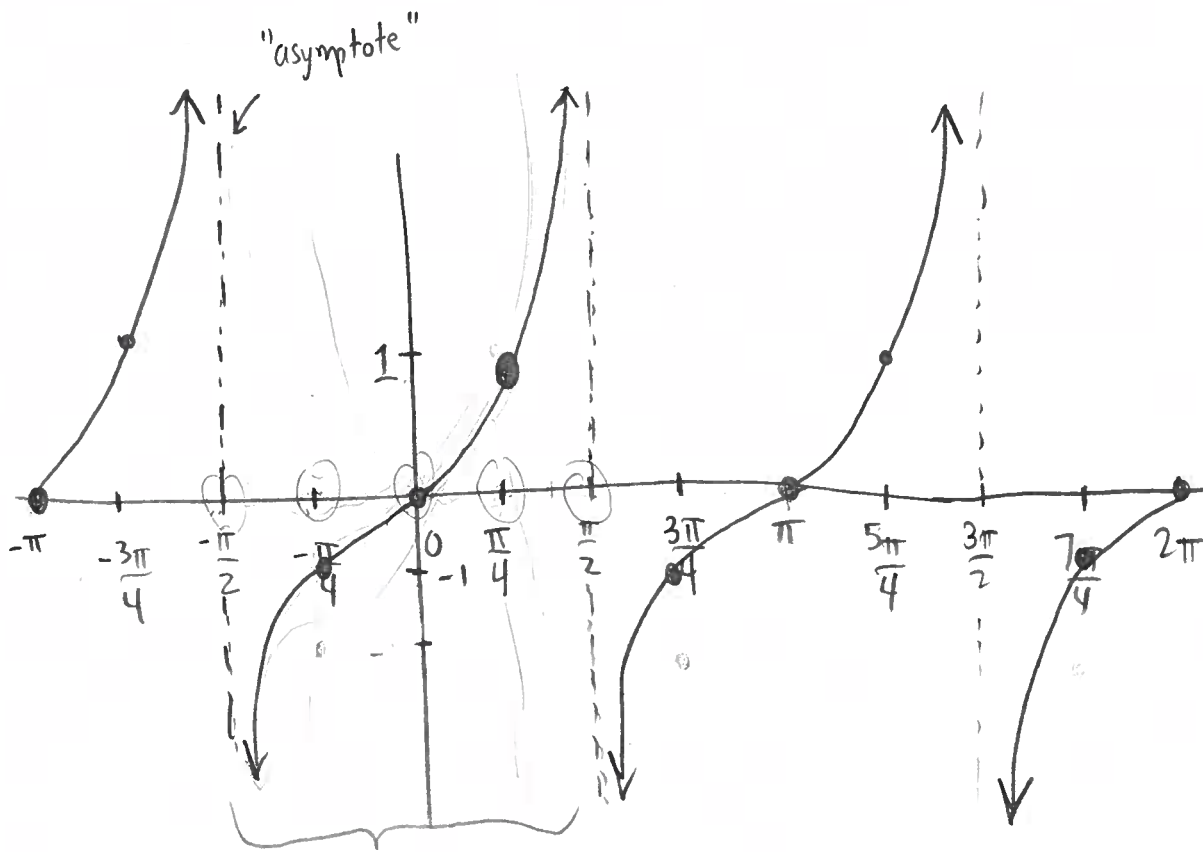


3

θ	$\tan(\theta)$
$-\pi$	0
$-\frac{3\pi}{2}$	1
$-\frac{\pi}{2}$	undef
$-\frac{\pi}{4}$	-1
0	$\frac{0}{1} = 0$
$\frac{\pi}{4}$	$\frac{\sqrt{2}/2}{\sqrt{2}/2} = 1$
$\frac{\pi}{2}$	$\frac{1}{0} \leftarrow \text{uh oh!} \leftarrow \text{undef}$
$\frac{3\pi}{4}$	$\frac{\sqrt{2}/2}{-\sqrt{2}/2} = -1$
π	$\frac{0}{-1} = 0$
$\frac{5\pi}{4}$	1
$\frac{3\pi}{2}$	$\frac{-1}{0} \leftarrow \text{uh oh!} \leftarrow \text{undef}$
$\frac{7\pi}{4}$	-1
2π	0

$$\frac{4}{2}$$

4



fact: *dividing by a smaller number gives you a bigger fraction

$$\frac{1}{0.0001} =$$

* dividing by a number close to zero gives you a fraction close to $+\infty$ or $-\infty$

Recall: \sin & \cos were 2π -periodic (repeat every full rotation)

We see here that \tan is π -periodic (repeat every half rotation)

Consequence: Anchor pts for $\tan(x)$ are

$$-\frac{\pi}{2}, -\frac{\pi}{4}, 0, \frac{\pi}{4}, \frac{\pi}{2}$$

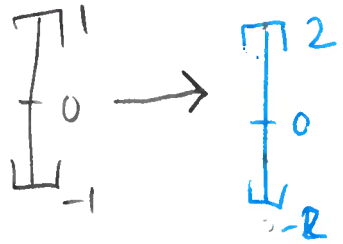
Ex: Plot $y = 2 \tan(x - \frac{\pi}{4})$

v. str
mult periods
by 2
2nd

h. shift right
add $\frac{\pi}{4}$ to x-values
1st

Anchor pts: $-\frac{\pi}{2}, -\frac{\pi}{4}, 0, \frac{\pi}{4}, \frac{\pi}{2}$

$-\frac{\pi}{4}, 0, \frac{\pi}{4}, \frac{\pi}{2}, \frac{3\pi}{4}$



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

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

