

MAT123

Graph Tangent

From Standard Angles to xy -Plane - Tangent

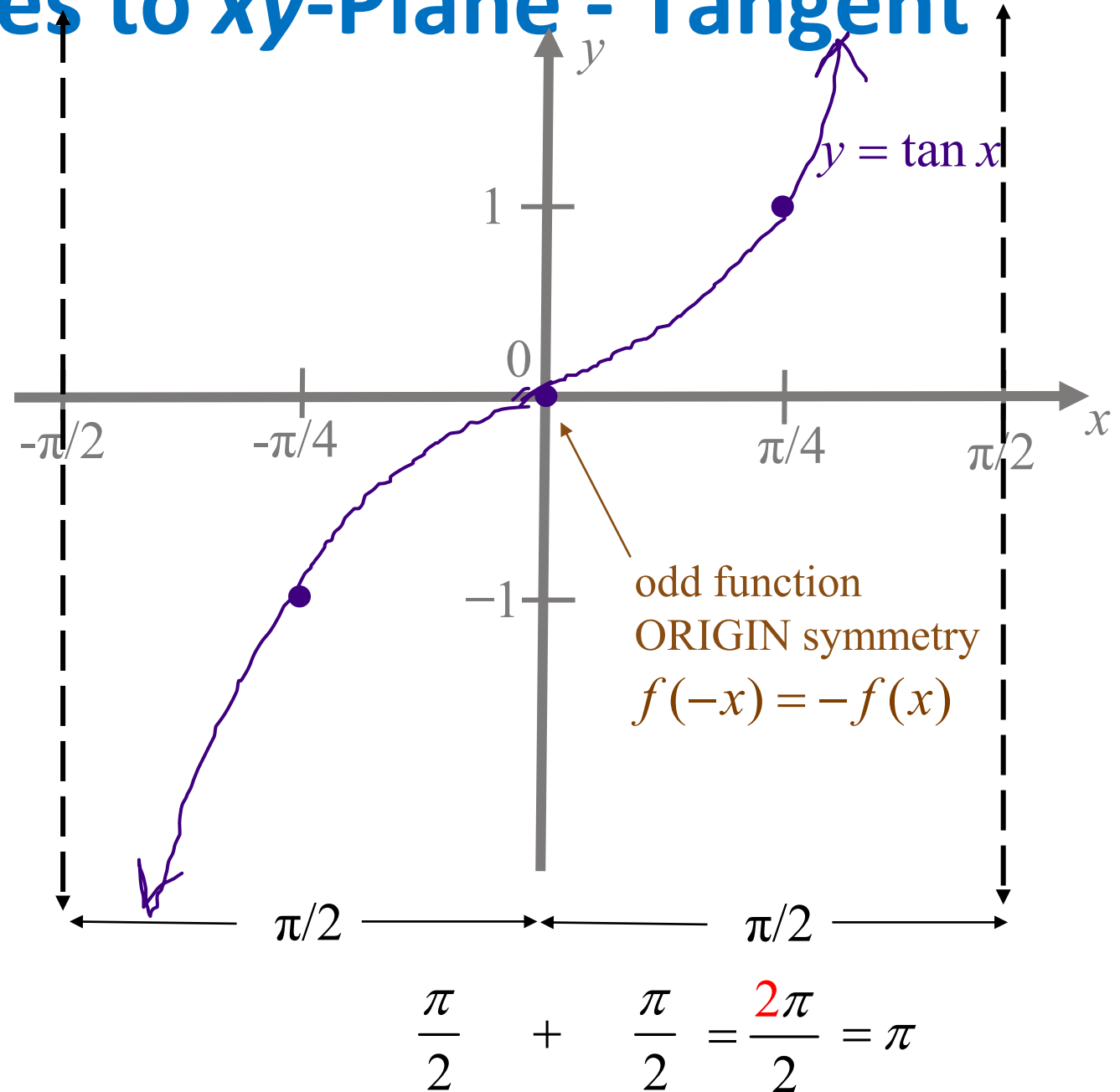
Table of Values for $y = \tan x$

θ	$\tan \theta$
0	0
$\frac{\pi}{4}$	1
$\frac{\pi}{2}$	UND use vertical asymptote

One period of $y = \tan x$ is π

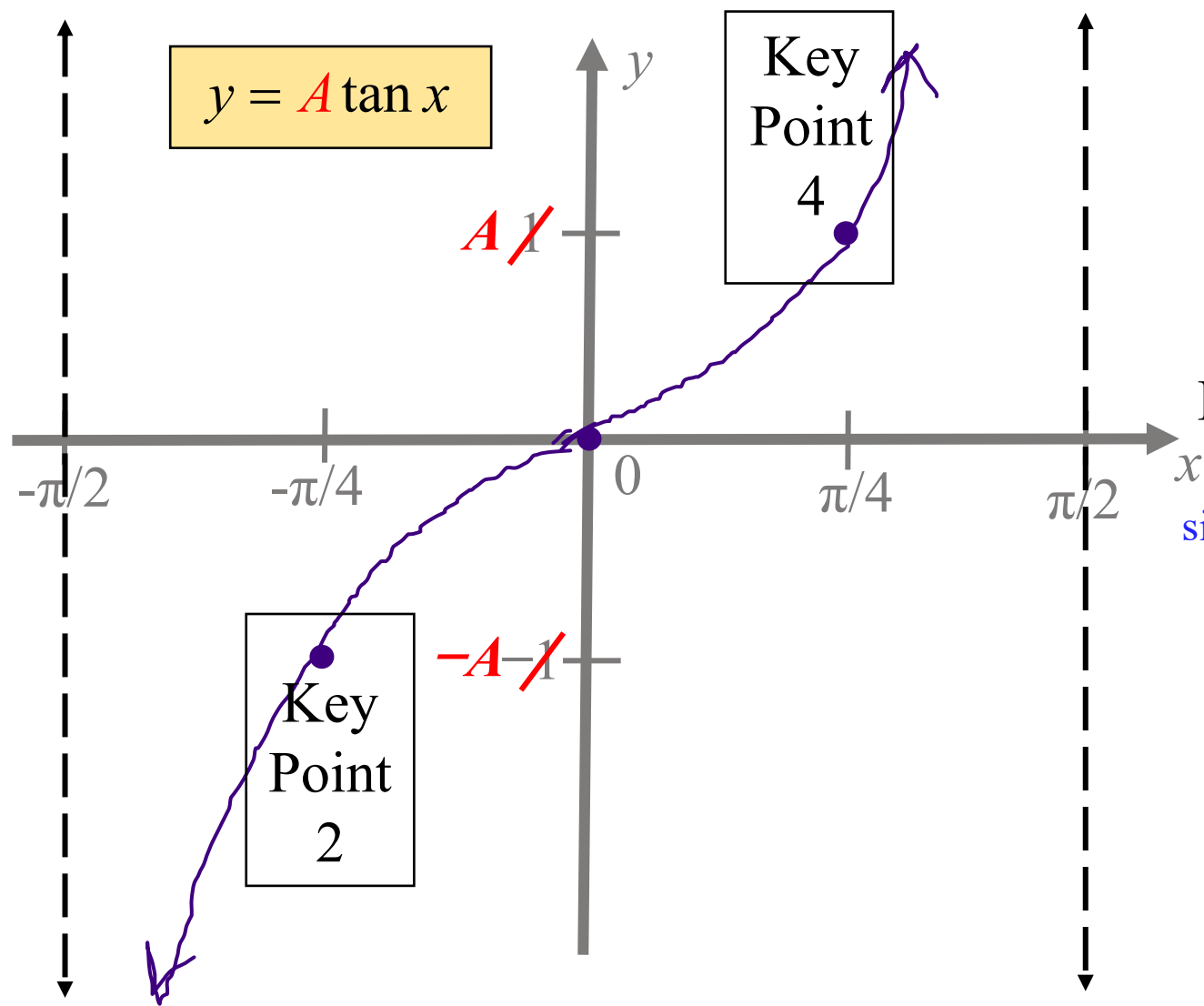
range: $(-\infty, \infty)$

domain: all real numbers except
odd multiples of $\pi/2$



Tangent Transformations

Amplitude for tangent affects Key Points 2 and 4.



Vertical asymptotes for $y = A \tan x$:

$$-\frac{\pi}{2} < x < \frac{\pi}{2}$$

Period transformation:

$$y = A \tan(Bx)$$

since standard period is π , transformed period is: $\frac{\pi}{B}$

Vertical asymptote transformation:

$$y = A \tan(Bx - C)$$

$$-\frac{\pi}{2} < Bx - C < \frac{\pi}{2}$$

then solve for x

Tangent Transformation – Example #1

ex. Graph 2 periods of $y = 2 \tan \frac{x}{2}$ for $-\pi < x < 3\pi$.

$$A = 2$$

$$Bx - C = \frac{x}{2} \quad \text{Find vertical asymptotes.}$$

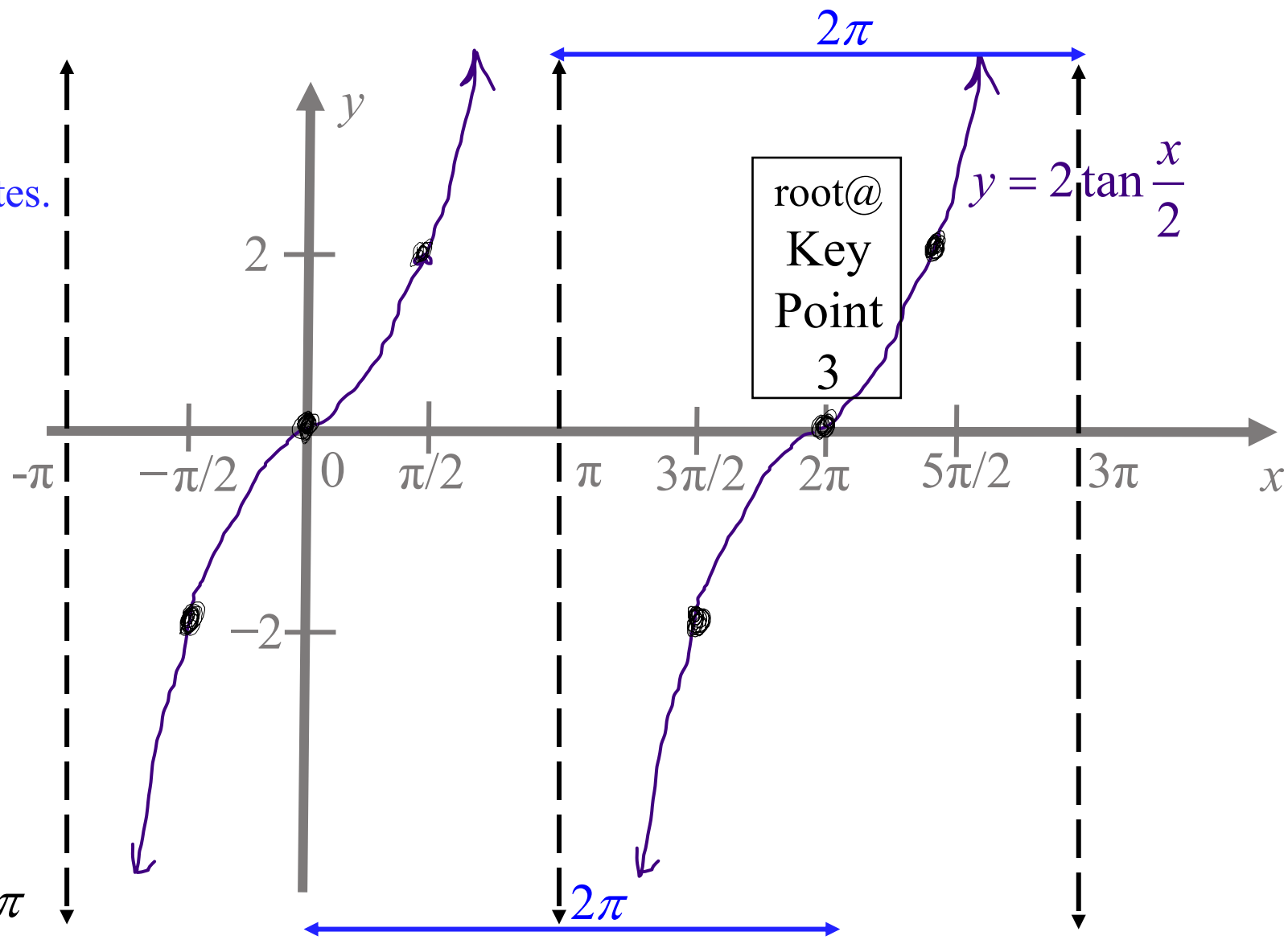
$$-\frac{\pi}{2} < \frac{x}{2} < \frac{\pi}{2} \quad \text{solve for } x$$

$$2 \left(-\frac{\pi}{2} < \frac{x}{2} < \frac{\pi}{2} \right) \quad \text{distribute 2}$$

$$-\cancel{2} \cdot \frac{\pi}{2} < \cancel{2} \cdot \frac{x}{2} < \cancel{2} \cdot \frac{\pi}{2}$$

$$-\pi < x < \pi$$

$$\text{Period: } \frac{\pi}{B} = \frac{\pi}{1/2} \xrightarrow{\text{KCF}} \pi \cdot \frac{2}{1} = 2\pi$$



Tangent Transformation – Example #2

ex. Graph one period of $y = \tan\left(x + \frac{\pi}{4}\right)$

$$A = 1$$

$$Bx - C = x + \frac{\pi}{4} \quad \text{Find vertical asymptotes.}$$



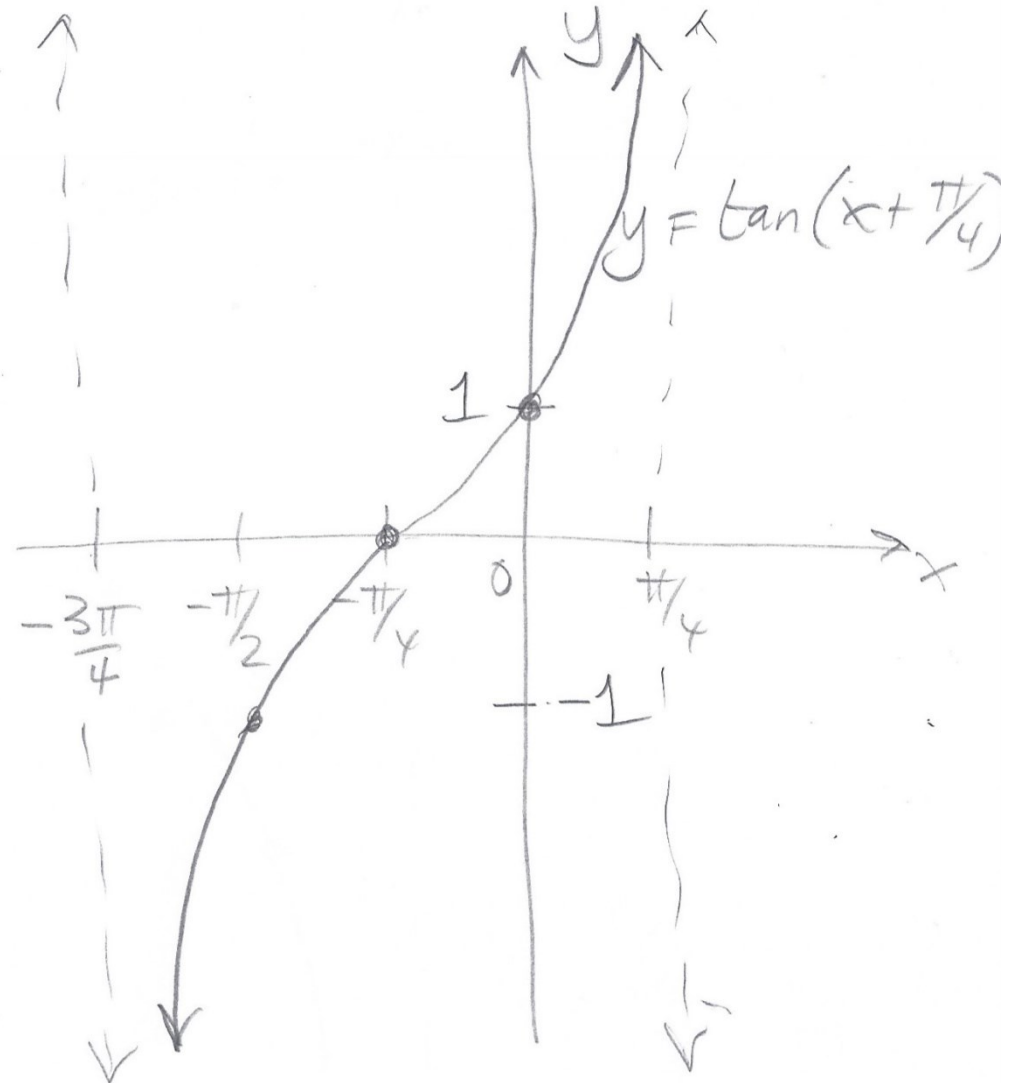
$$-\frac{\pi}{2} < x + \frac{\pi}{4} < \frac{\pi}{2} \quad \text{subtract } \pi/4$$

$$-\frac{\pi}{2} - \frac{\pi}{4} < x + \frac{\pi}{4} - \frac{\pi}{4} < \frac{\pi}{2} - \frac{\pi}{4}$$

get LCD

$$-\frac{\pi}{2} \cdot \frac{2}{2} - \frac{\pi}{4} \qquad \frac{\pi}{2} \cdot \frac{2}{2} - \frac{\pi}{4}$$

$$-\frac{3\pi}{4} < x < \frac{\pi}{4}$$



Tangent Transformation – Do

Do: Graph one period of $y = -3 \tan\left(x - \frac{\pi}{2}\right)$