

GRAPHS OF $\tan x$ + $\cot x$

	$y = a \frac{\sin}{\cos} (bx+c) + d$	$y = a \frac{\sec}{\csc} (bx+c) + d$	$y = a \frac{\tan}{\cot} (bx+c) + d$
amp	$ a $	NA	NA
per.	$\frac{2\pi}{b}$	$\frac{2\pi}{b}$	π
p.s.	$bx+c=0$	$bx+c=0$	$bx+c=0$
v.s.	d	d	d

$$\underline{y = \tan x}$$

$\tan x$ rises

$\tan x$ shifts contr to phase shift.

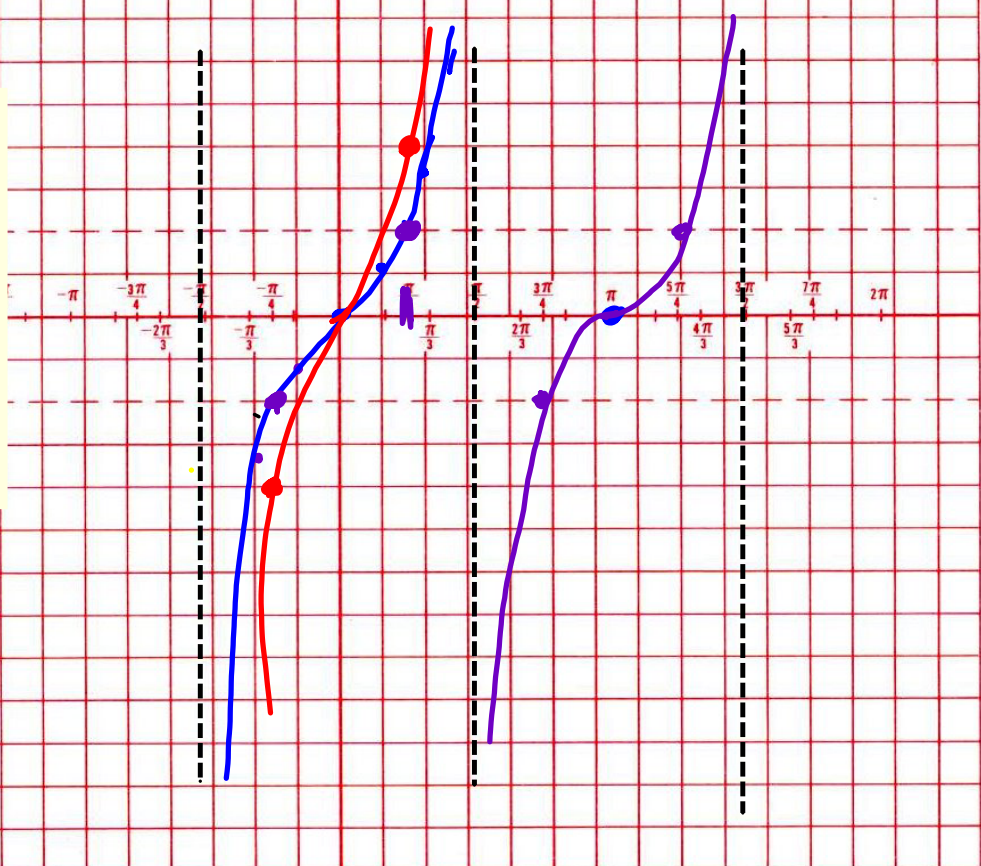
$$\underline{y = \cot x}$$

* $\cot x$ falls

$\cot x$ shifts a symp. to phase shift

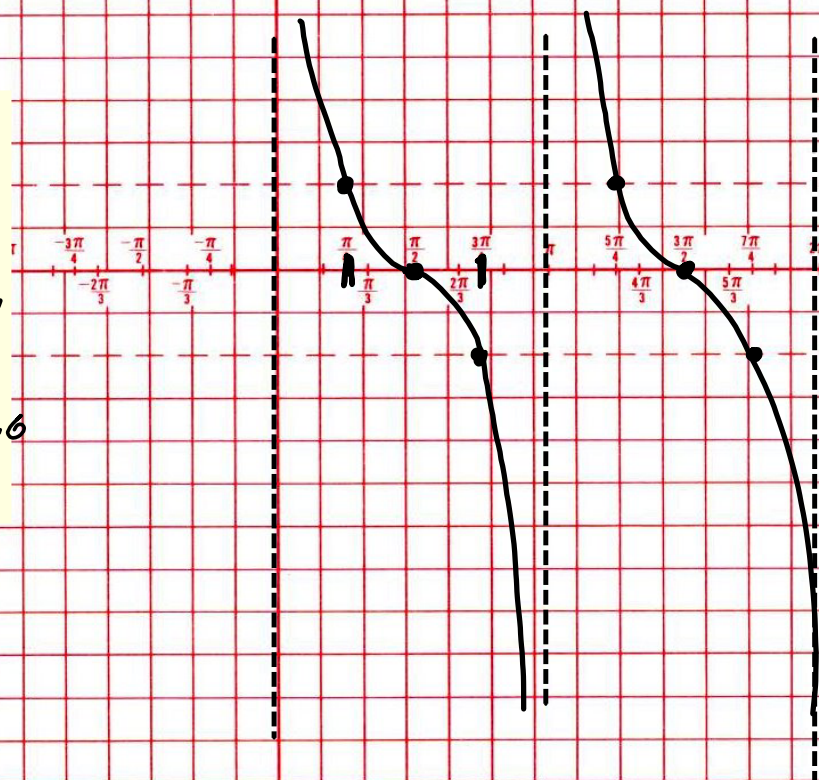
$$y = 2 \tan x$$

0	0
$\frac{\pi}{6}$	$\frac{\sqrt{3}}{3} \approx 0.6$
$\frac{\pi}{4}$	$\sqrt{2}$
$\frac{\pi}{3}$	$\sqrt{3} \approx 1.7$
$\frac{\pi}{2}$	Undef



$$y = \cot x$$

0	undef
$\frac{\pi}{6}$	$\sqrt{3} = 1.7$
$\frac{\pi}{4}$	1
$\frac{\pi}{3}$	$\frac{\sqrt{3}}{3} = 0.6$
$\frac{\pi}{2}$	0

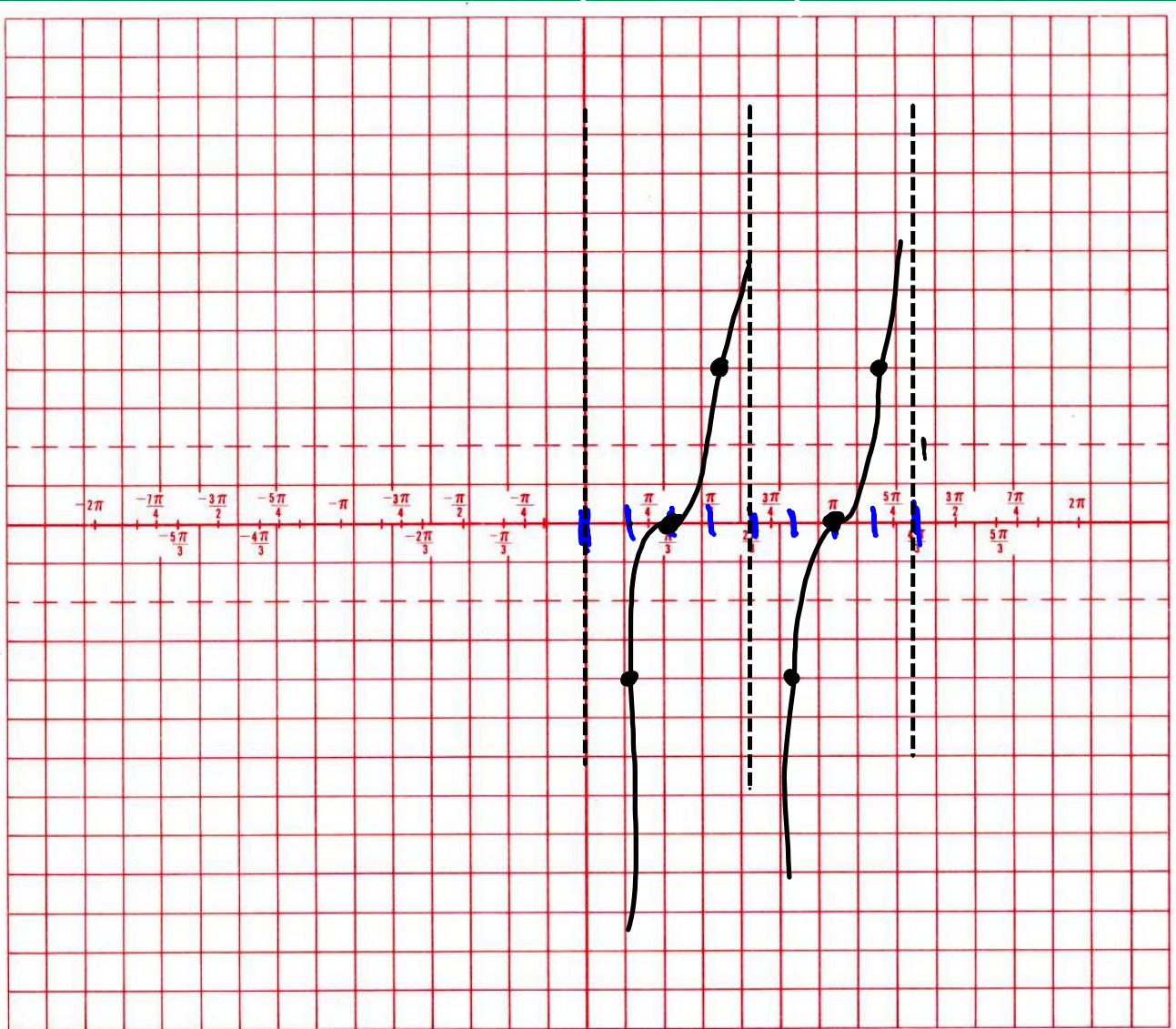


$$y = 2 \tan\left(\frac{3}{2}x - \frac{\pi}{2}\right)$$

AMP NA(2) V.S. 0
 per $\frac{\pi}{3/2} = \frac{2\pi}{3}$ P.S. $\frac{3}{2}x = \frac{\pi}{2} + \frac{2\pi}{3}$
 $x = \frac{\pi}{3}$

Spacing
 $\frac{2\pi}{3} \cdot \frac{1}{4} = \frac{\pi}{6}$

0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$
		P.S.		
0	$\frac{\pi}{6}$	$\frac{2\pi}{6}$	$\frac{3\pi}{6}$	$\frac{4\pi}{6}$



$$y = 3 - \cot\left(\frac{1}{2}x + \frac{\pi}{8}\right)$$

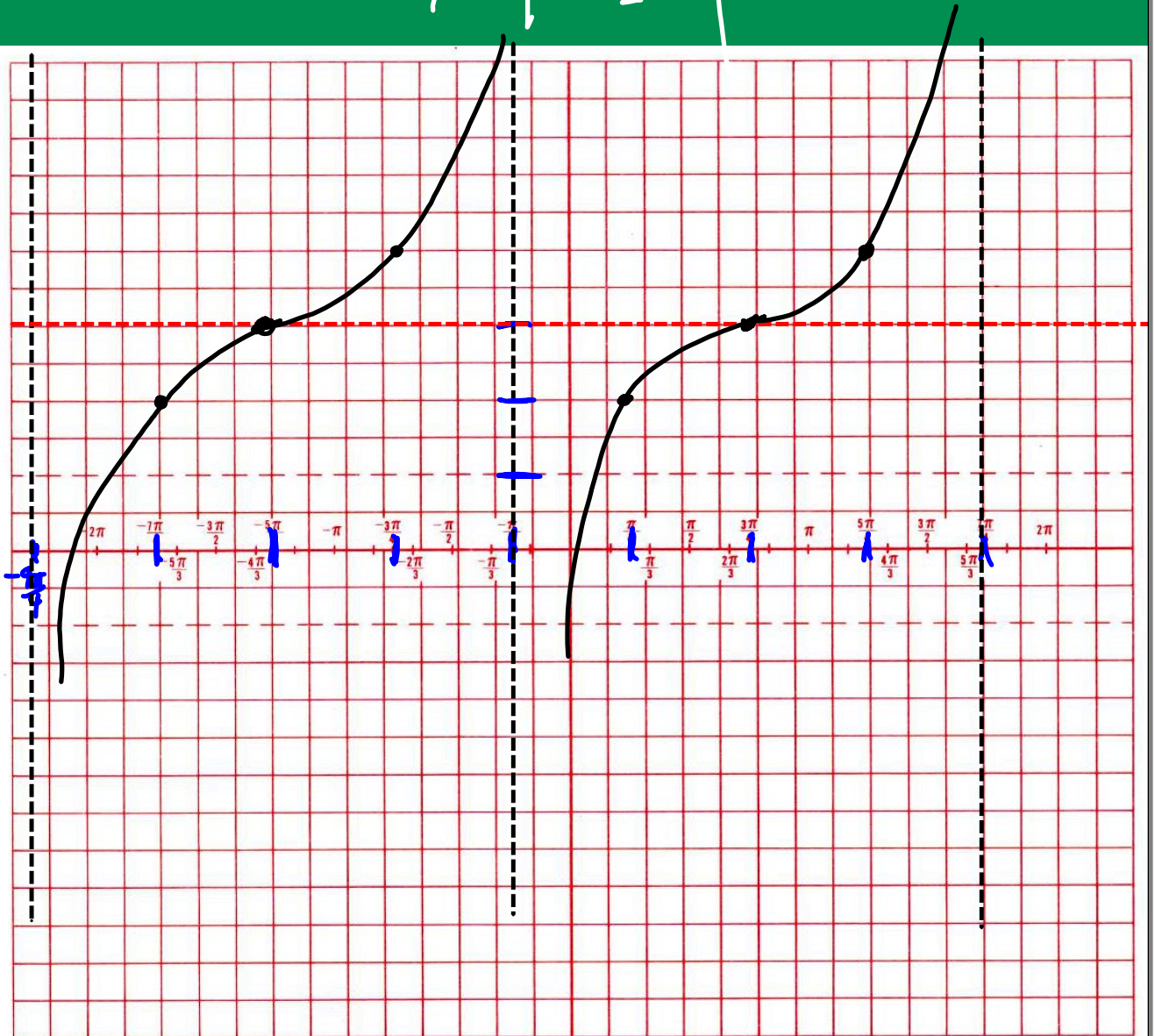
V.S. 3
amp 1(-)

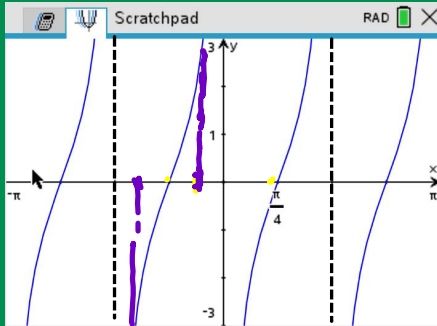
per. $\frac{\pi}{1/2} = 2\pi$
p.s. $\frac{1}{2}x = -\frac{\pi}{8} \cdot 2$
 $x = -\frac{\pi}{4}$

Spacing

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

$-\frac{\pi}{4}$	$\frac{\pi}{4}$	$\frac{3\pi}{4}$	$\frac{5\pi}{4}$	$\frac{7\pi}{4}$
p.s. $\sqrt{\quad}$				
$+ \frac{2\pi}{4}$				





tan x

v.s. 0

amp 3

per. $\frac{\pi}{2}$

$$b = \frac{\pi}{\text{period}} = \frac{\pi}{\frac{\pi}{2}} = 2$$

p.s. - shifts center
 $= \frac{\pi}{4}$

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

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

