# GRAPHS OF tan x + cot x

$$y = a \underline{\quad} (bx+c) + d$$

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

$y=\tan x$

* rises
* shifts center pt.

$*$

$y=\cot x$

* falls
* shifts the asymptote

$$y = \tan x$$

| | |
|---|---|
| 0 | 0 |
| $\pi/6$ | $\frac{\sqrt{3}}{3} = 0.6$ |
| $\pi/4$ | 1 |
| $\pi/3$ | $\sqrt{3} = 1.7$ |
| $\pi/2$ | Undef |

$per = \pi$
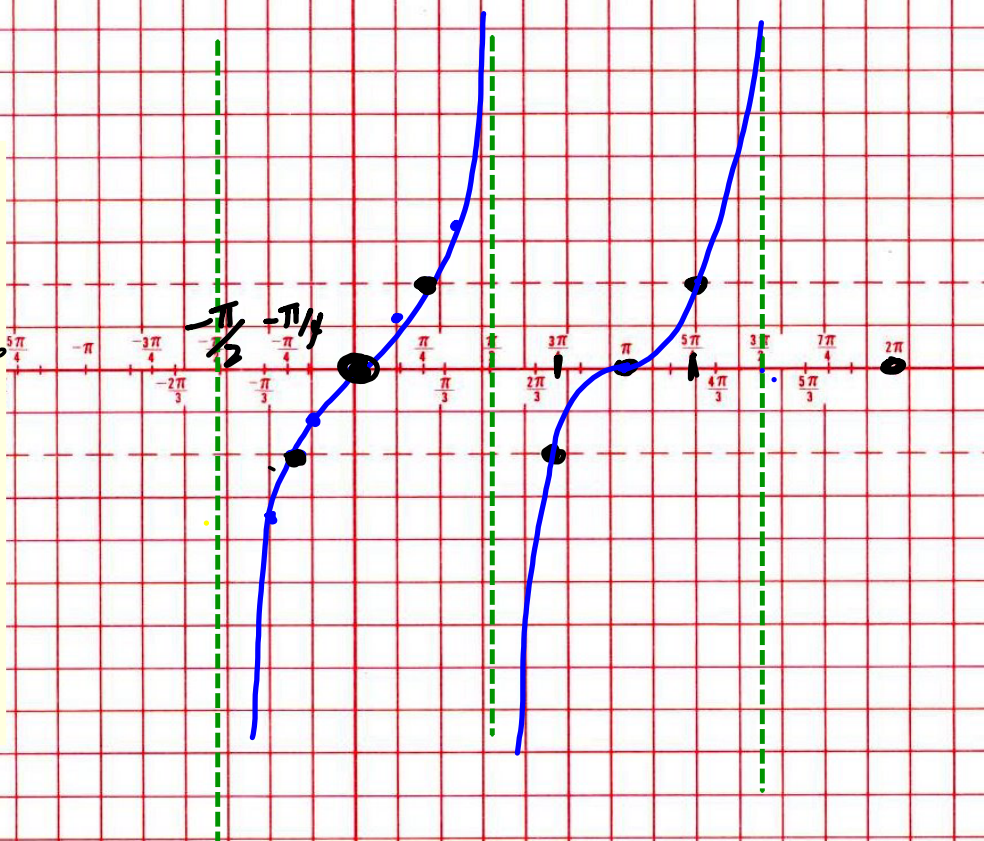
$$y = \cot x$$

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

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

V.S.    amp    per.    p.s.
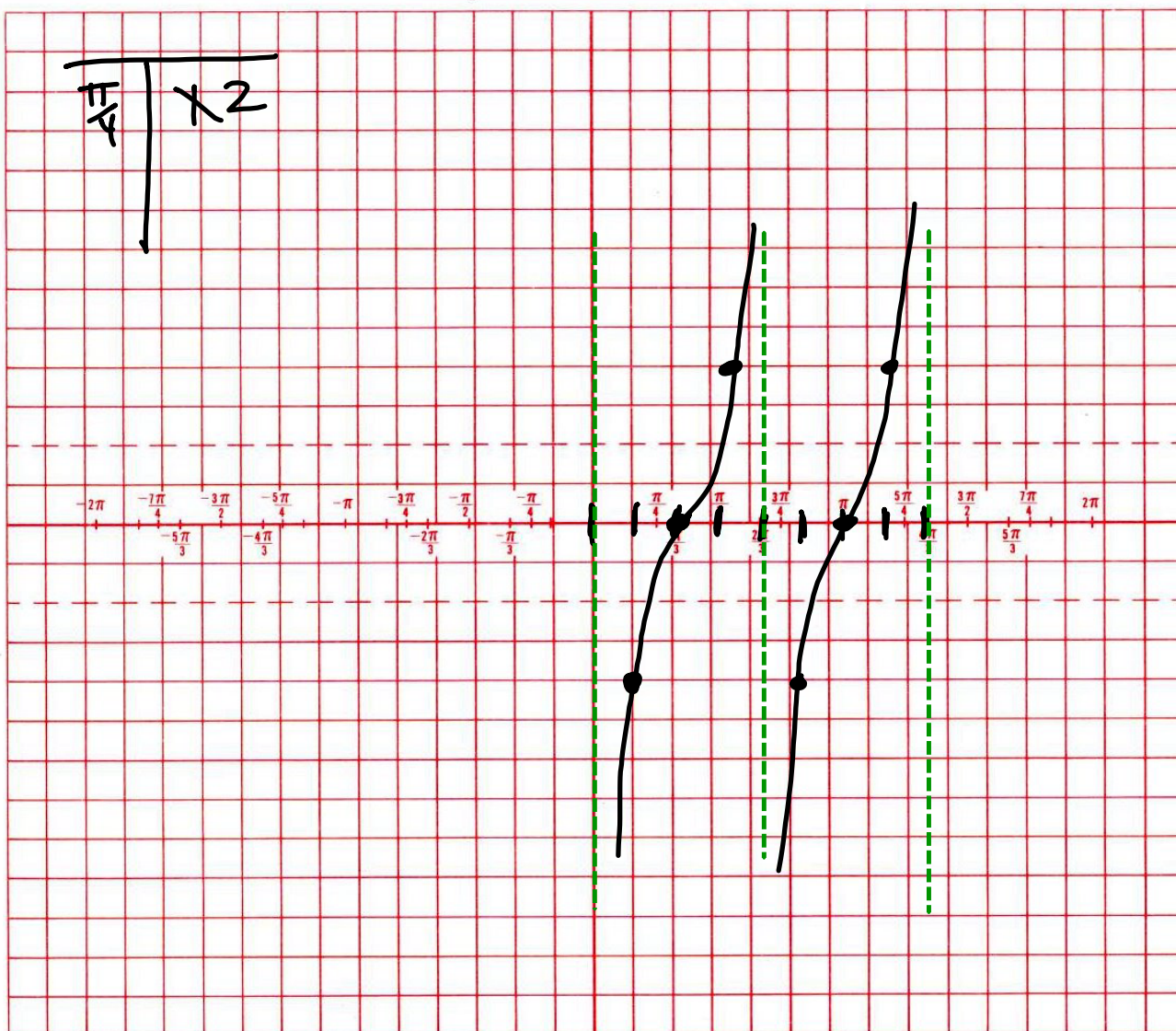
$0$    NA (2)    $\frac{\pi}{3/2} = \frac{2\pi}{3}$    $\frac{3}{2}x = \frac{\pi}{2}$    $x = \frac{\pi}{2} \cdot \frac{2}{3}$    $x = \frac{\pi}{3}$

Spacing

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

$0 \quad \frac{\pi}{6} \quad \frac{\pi}{3} \quad \frac{\pi}{2} \quad \frac{2\pi}{3}$

p.s.

$0 \quad \frac{\pi}{6} \quad \frac{2\pi}{6} \quad \frac{3\pi}{6} \quad \frac{4\pi}{6}$

$\frac{\pi}{4} \quad \times 2$

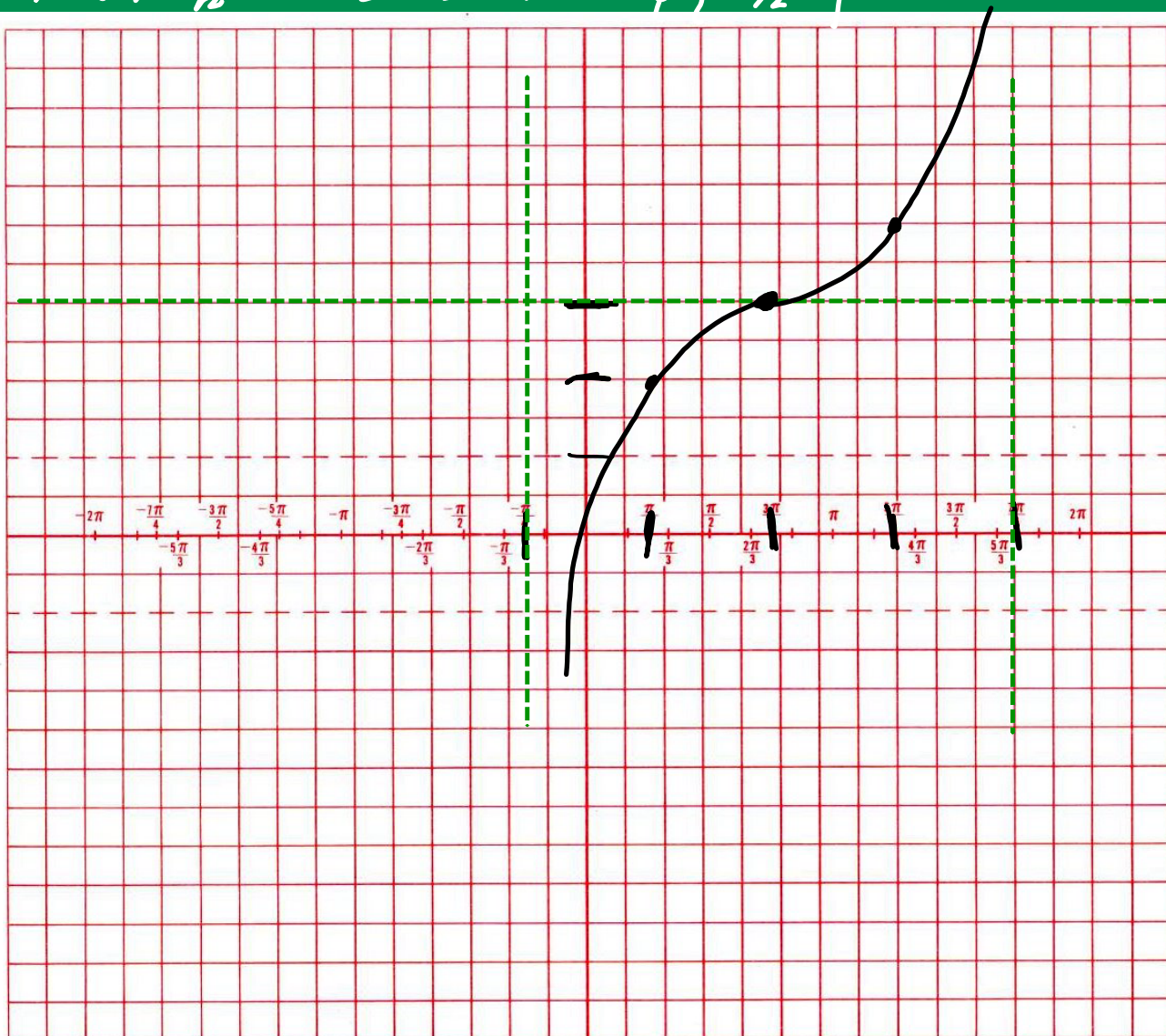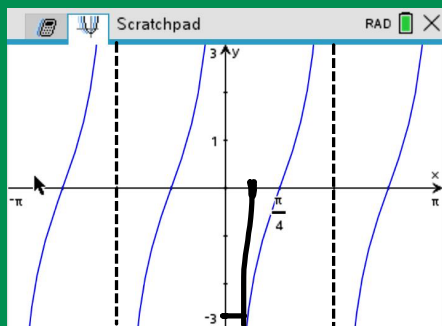$y = 3 - \cot(\frac{1}{2}x + \frac{\pi}{8})$

$\underset{NA\,(-1)}{\underline{Amp}}$  $\underset{\frac{\pi}{\frac{1}{2}}=2\pi}{\underline{per}}$  $\underset{3}{\underline{V.S.}}$  $\underset{x\cdot\frac{1}{2}\quad x=\frac{-\pi}{8}\quad x=\frac{-\pi}{4}}{\underline{p.s.}}$

$\left\{\begin{array}{l} \text{Spacing} \\ 2\pi \cdot \frac{1}{4} \\ = \frac{\pi}{2} \end{array}\right.$

$\frac{-\pi}{4} \quad \frac{\pi}{4} \quad \frac{3\pi}{4} \quad \frac{5\pi}{4} \quad \frac{7\pi}{4}$

p.s.

Scratchpad — RAD



tan x

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

V.S. 0

amp 3

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

p.s. $\frac{\pi}{4}$

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

$b = 2$

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