

$$1. y = \frac{1}{2} \tan\left(\frac{\theta}{2} + \frac{5\pi}{6}\right) - 2$$

$$\text{vert} = -2$$

$$\text{per} = 2\pi$$

$$\text{hor} = -\frac{5\pi}{3}$$

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

$$-\frac{5\pi}{3} \quad -2$$

$$-\frac{7\pi}{6} \quad -1/2$$

$$-\frac{2\pi}{3} \quad \text{und}$$

$$-\frac{\pi}{6} \quad 2/2$$

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

$$\text{Dom: } \left[-\frac{5\pi}{3}, -\frac{2\pi}{3}\right) \left(-\frac{2\pi}{3}, \frac{\pi}{3}\right]$$

Range: \mathbb{R} 's



asym: $-\frac{2\pi}{3}$

neither

$$\text{inc: } \left[-\frac{5\pi}{3}, -\frac{2\pi}{3}\right) \left(-\frac{2\pi}{3}, \frac{\pi}{3}\right]$$

max: NA
min: NA

$$2. y = 3 \cot\left(\frac{\theta}{3} + \frac{\pi}{6}\right) - 1$$

$$\text{vert} = -1$$

$$\text{per} = 3\pi$$

$$\text{hor} = -\frac{\pi}{2}$$

$$\frac{3\pi}{4}$$

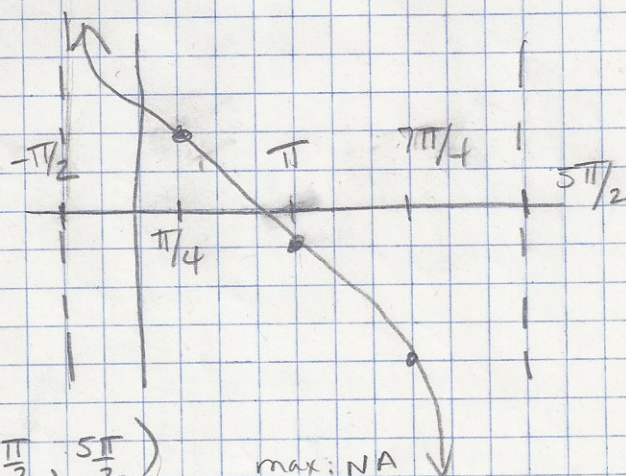
$$-\frac{\pi}{2} \quad \text{und}$$

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

$$\pi \quad -1$$

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

$$\frac{5\pi}{2} \quad \text{und}$$



$$\text{Dom: } \left(-\frac{\pi}{2}, \frac{5\pi}{2}\right)$$

$$\text{Range: } (-\infty, \infty)$$

$$\text{asym: } -\frac{\pi}{2}, \frac{5\pi}{2}$$

$$\text{dec: } \left(-\frac{\pi}{2}, \frac{5\pi}{2}\right)$$

max: NA
min: NA

neither

$$3. y = 3 \csc \frac{\theta}{3} + 1$$

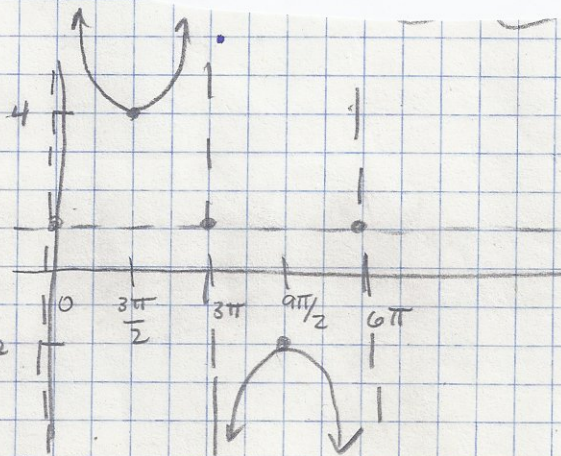
$$\text{vert} = 1$$

$$\text{amp} = 3$$

$$\text{per} = 6\pi$$

$$\frac{\pi}{6}$$

0	und
$\frac{3\pi}{2}$	4
3π	und
$\frac{9\pi}{2}$	-2
6π	und



$$\text{dom: } (0, 3\pi) \quad (3\pi, 6\pi)$$

$$\text{range: } (-\infty, -2] \quad [4, \infty)$$

$$\text{rel max: } \left(\frac{9\pi}{2}, -2\right)$$

$$\text{rel min: } \left(\frac{3\pi}{2}, 4\right)$$

neither

$$\text{dec: } \left(0, \frac{3\pi}{2}\right) \quad \left(\frac{9\pi}{2}, 6\pi\right)$$

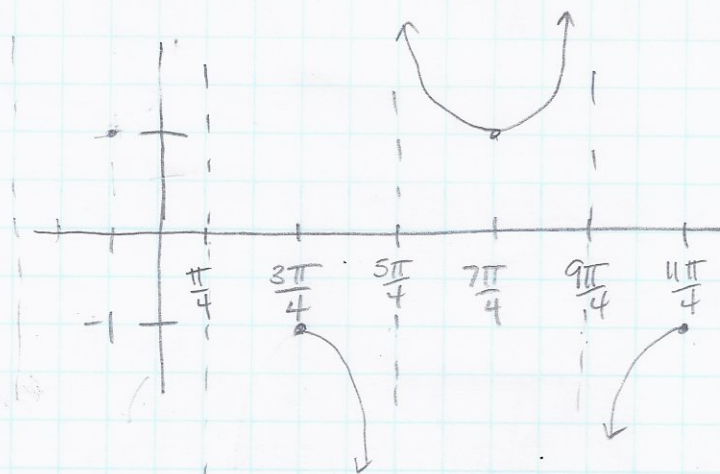
$$\text{inc: } \left(\frac{3\pi}{2}, 3\pi\right) \quad \left(3\pi, \frac{9\pi}{2}\right)$$

$$4. y = -\sec\left(\theta - \frac{3\pi}{4}\right)$$

$$\text{per} = 2\pi$$

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

$\frac{3\pi}{4}$	-1
$\frac{5\pi}{4}$	und
$\frac{7\pi}{4}$	
$\frac{9\pi}{4}$	
$\frac{11\pi}{4}$	



neither

$$\text{rel max } \left(\frac{3\pi}{4}, -1\right) \quad \left(\frac{11\pi}{4}, -1\right)$$

$$\text{rel min } \left(\frac{7\pi}{4}, 1\right)$$

$$\text{dom } \left[\frac{3\pi}{4}, \frac{5\pi}{4}\right) \quad \left(\frac{5\pi}{4}, \frac{9\pi}{4}\right)$$

$$\text{range } (-\infty, -1] \quad [1, \infty)$$

$$\left(\frac{9\pi}{4}, \frac{11\pi}{4}\right]$$

$$\text{dec. } \left(\frac{3\pi}{4}, \frac{5\pi}{4}\right) \quad \left(\frac{5\pi}{4}, \frac{7\pi}{4}\right)$$

$$\text{inc } \left(\frac{7\pi}{4}, \frac{9\pi}{4}\right) \quad \left(\frac{9\pi}{4}, \frac{11\pi}{4}\right)$$