

Tangent

Cotangent

$|A| = \text{none}$

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

$\varphi = -\frac{C}{B}$

V.T. $y = D$

Ex: $y = \frac{1}{2} \tan(x + \frac{\pi}{4})$

$\rightarrow \tan(Bx + C) + D$

$|A| = n/a$

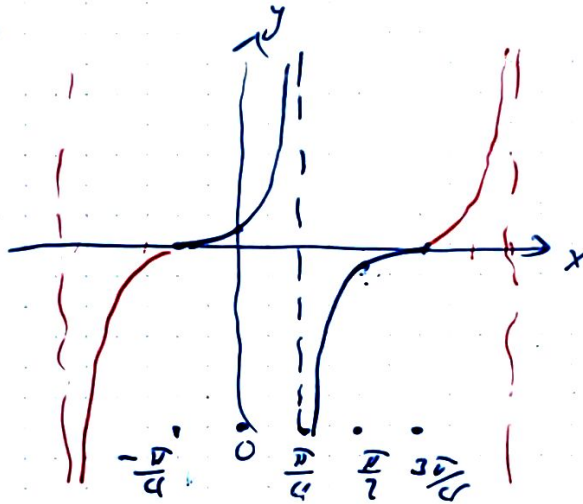
$P = \pi$

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

V.T. $y = 0$

	x	y
0	$-\frac{\pi}{4}$	0
$\frac{\pi}{4}$	0	$\frac{1}{2}$
$\frac{\pi}{2}$	$\frac{\pi}{4}$	∞
$\frac{3\pi}{4}$	$\frac{\pi}{2}$	$-\frac{1}{2}$
π	$\frac{3\pi}{4}$	0

x	$y = A \tan(Bx + C) + D$
$0 + \varphi$	$0 + D$
$\frac{1}{4}P$	$A + D$
$\frac{1}{2}P$	∞
$\frac{3}{4}P$	$-A$
P	0



Cotangent

	$y = A \cot(Bx + C) + D$
$0 + \phi$	∞
$\frac{P}{4}$	A
$\frac{P}{2}$	0
$\frac{3P}{4}$	$-A$
P	∞

Graph: $y = \cot\left(2x - \frac{\pi}{2}\right)$

$|A| = \text{none}$

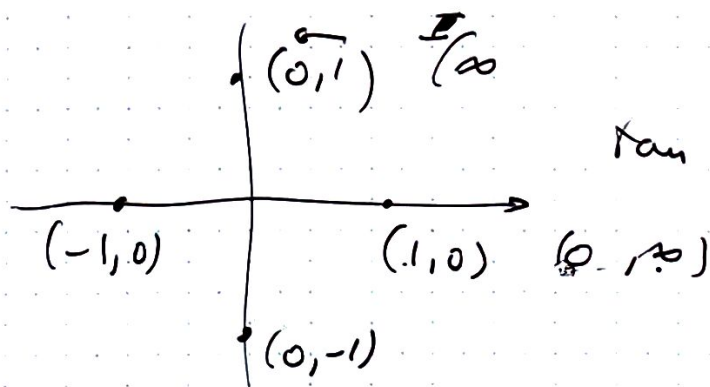
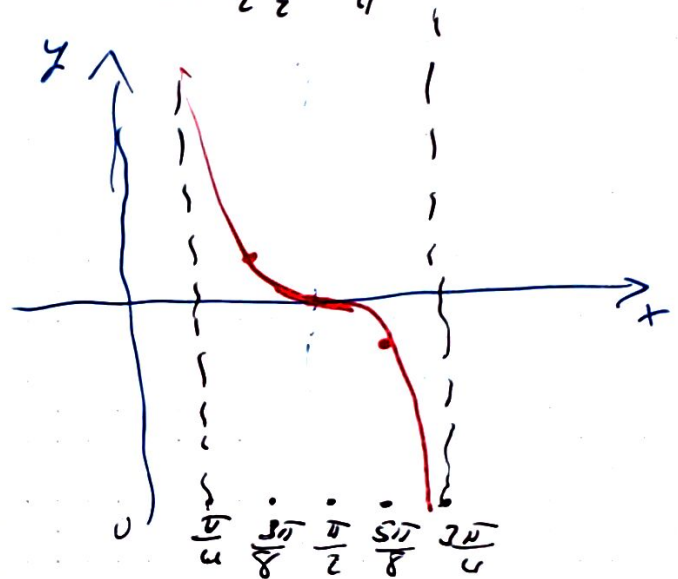
$$P = \frac{\pi}{2} \left(\frac{1}{|B|}\right)$$

$$\phi = -\frac{C}{B} = +\frac{\pi/2}{2} = \frac{\pi}{4}$$

$$\text{V.T.: } y = D = 0$$

	X	y
$0 - \frac{\pi}{4}$	$\frac{\pi}{4}$	∞
$\frac{\pi}{8} + \frac{\pi}{4}$	$\frac{3\pi}{8}$	1
$\frac{\pi}{4}$	$\frac{\pi}{2}$	0
$\frac{3\pi}{8}$	$\frac{5\pi}{8}$	-1
$\frac{\pi}{2}$	$\frac{3\pi}{4}$	∞

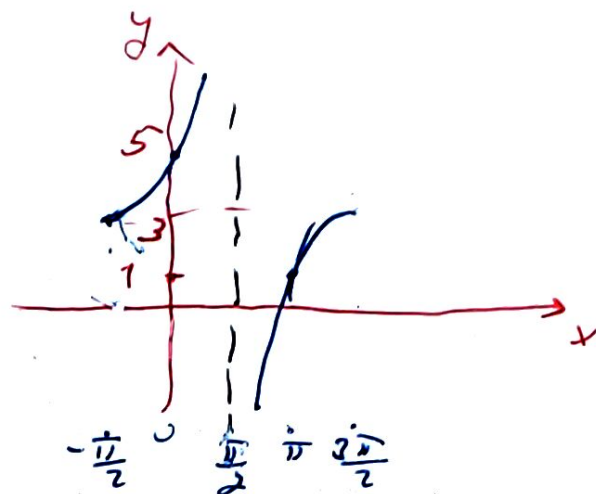
$\frac{1}{4}$	$\frac{2}{4}$
$\frac{2}{8}$	$\frac{3}{8}$
$\frac{3}{8}$	$\frac{4}{8}$
$\frac{4}{8}$	$\frac{5}{8}$
$\frac{5}{8}$	$\frac{6}{8}$



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

$$|A| = \text{none} \quad P = \frac{\pi}{2} = 2\pi \quad \phi = -\frac{\pi}{4} \cdot \frac{1}{2} = -\frac{\pi}{2} \quad \text{V.T. } y = 3$$

	X	Y	
$0 - \frac{\pi}{2}$	$-\frac{\pi}{2}$	$0 + 3$	3
$\frac{\pi}{2} - \frac{\pi}{2}$	0	$2 + 3$	5
π	$\frac{\pi}{2}$	∞	∞
$\frac{3\pi}{2}$	π	$-2 + 3$	1
2π	$\frac{3\pi}{2}$	$0 + 3$	3



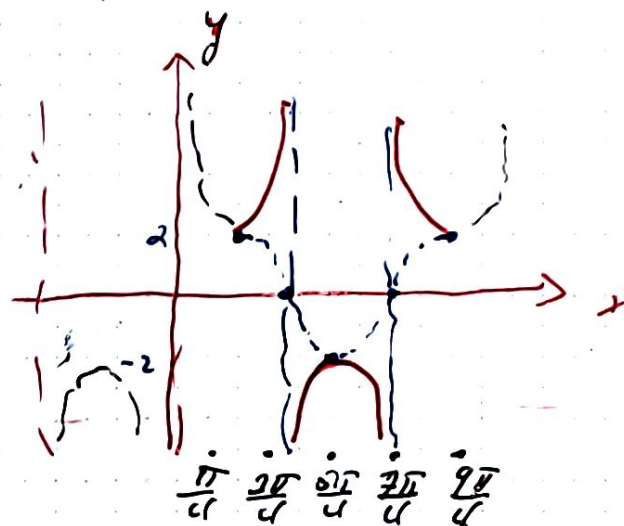
Secant & Cosecant
Cosine Sine

$$\text{Amplitude} = \text{none} \quad P = \frac{2\pi}{3} \quad \phi = -\frac{c}{3} \quad \text{V.T. } y = D$$

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

$$|A| = \text{none} \quad P = 2\pi \quad C = +\frac{\pi}{4} \quad \text{V.T. } y = 0$$

	X	Y = 2 \cos(x - \pi/4)
$0 + \frac{\pi}{4}$	$\frac{\pi}{4}$	2
$\frac{\pi}{2} + \frac{\pi}{4}$	$\frac{3\pi}{4}$	0
π	$\frac{5\pi}{4}$	-2
$\frac{3\pi}{2}$	$\frac{7\pi}{4}$	0
2π	$\frac{9\pi}{4}$	2



$$-1 \leq \text{Cosine} \leq 1$$

$$\text{Sine}$$

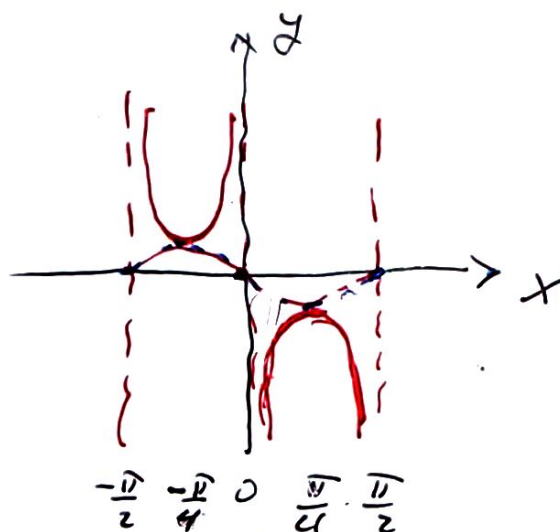
$$\text{secant} \leq -1 \geq 1$$

$$\text{cosecant}$$

$$y = \cos(2x + \pi)$$

$$|A| = n/a \quad P = \frac{2\pi}{2} = \pi \quad \phi = -\frac{\pi}{2} \quad \text{V.T: } y = 0$$

	X	$y = \sin(2x + \pi)$
$0 - \frac{\pi}{2}$	$-\frac{\pi}{2}$	0
$\frac{\pi}{4} - \frac{\pi}{2}$	$-\frac{\pi}{4}$	1
$\frac{\pi}{2}$	0	0
$\frac{3\pi}{4}$	$\frac{\pi}{4}$	-1
π	$\frac{\pi}{2}$	0

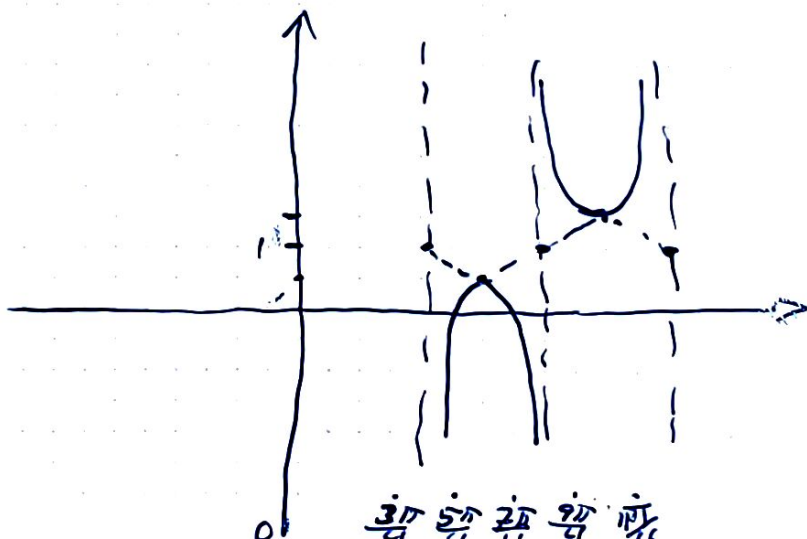


7.2
7 $y = 1 - \frac{1}{2} \cos(x - \frac{3\pi}{4})$

$$|A| = n/a \quad P = 2\pi \quad \phi = +\frac{3\pi}{4} \quad \text{V.T: } y = 1$$

	X	$y = 1 - \frac{1}{2} \sin(x - \frac{3\pi}{4})$
$0 + \frac{\pi}{4}$	$\frac{\pi}{4}$	$0 + 1 = 1$
$\frac{\pi}{2} + \frac{3\pi}{4}$	$\frac{5\pi}{4}$	$-\frac{1}{2} + 1 = \frac{1}{2}$
π	$\frac{7\pi}{4}$	$0 + 1 = 1$
$\frac{3\pi}{2}$	$\frac{9\pi}{4}$	$\frac{1}{2} + 1 = \frac{3}{2}$
2π	$\frac{11\pi}{4}$	$0 + 1 = 1$

$$\left(\frac{1}{2} \cdot \frac{2}{1} + \frac{3}{4}\right)$$



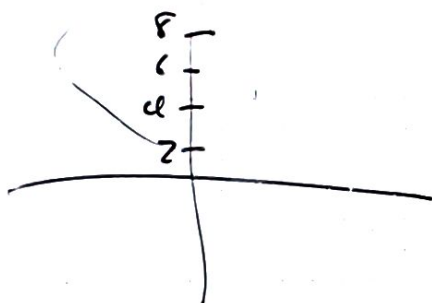
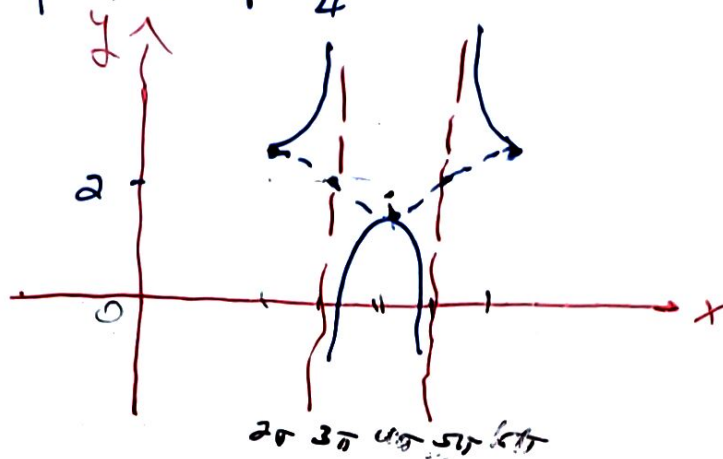
11.8

$$y = 2 + \frac{1}{4} \sec\left(\frac{1}{2}x - \pi\right)$$

$$|A| = n/a \quad P = \frac{2\pi}{\frac{1}{2}} = 4\pi \quad \phi = +\frac{\pi}{2} = 2\pi$$

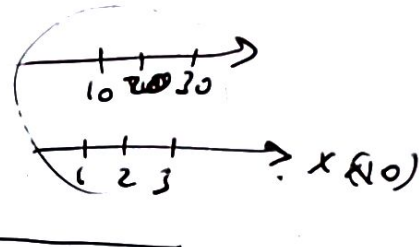
$$VT: y = 2$$

	x	y = 2 + \frac{1}{4} \sec(\frac{1}{2}x - \pi)
0 + 2\pi	2\pi	\frac{1}{4} + 2
\pi + 2\pi	3\pi	0 + 2
2\pi	4\pi	-\frac{1}{4} + 2
3\pi	5\pi	0 + 2
4\pi	6\pi	\frac{1}{4} + 2



...

2-



7.2 # 9

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

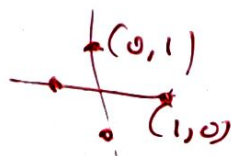
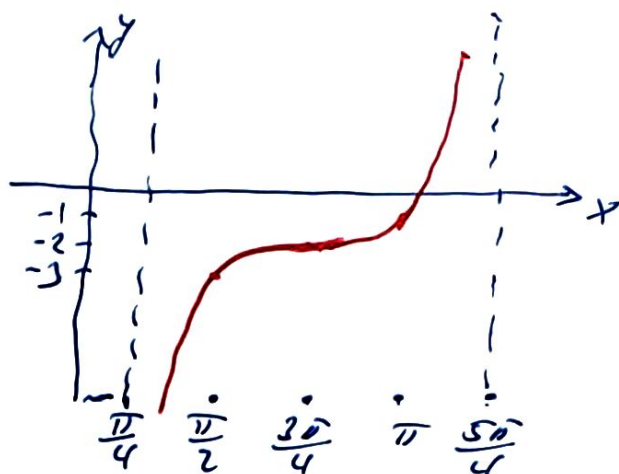
$$|A| = n/a$$

$$P = \pi$$

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

$$V.T: y = -2$$

	X	y	
$0 + \frac{\pi}{4}$	$\frac{\pi}{4}$	∞	∞
$\frac{\pi}{4} + \frac{\pi}{4}$	$\frac{\pi}{2}$	-1 - 2	-3
$\frac{\pi}{2} + \frac{\pi}{4}$	$\frac{3\pi}{4}$	0 - 2	-2
$\frac{3\pi}{4} + \frac{\pi}{4}$	π	1 - 2	-1
$\pi + \frac{\pi}{4}$	$\frac{5\pi}{4}$	∞	∞



7.1
25

$$y = -4 \sin(3x - \pi) - 3$$

$$|A| = 4$$

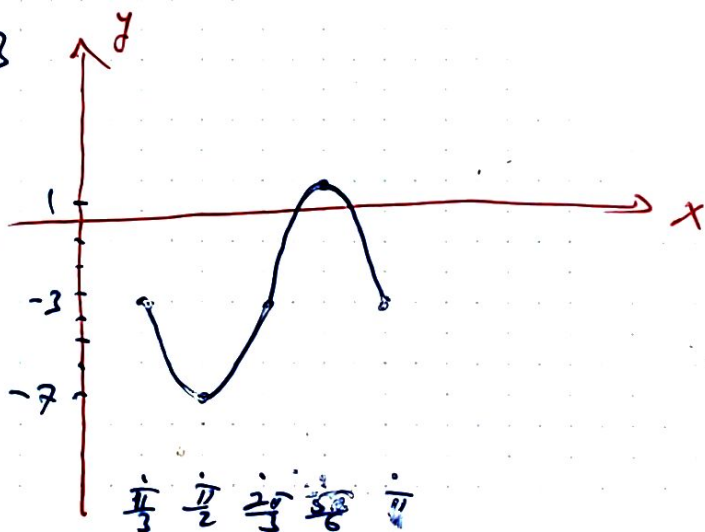
$$P = \frac{2\pi}{3}$$

$$\varphi = \frac{\pi}{3}$$

$$V.T: y = -3$$

	X	y	
$0 + \frac{\pi}{3}$	$\frac{\pi}{3}$	0 - 3	-3
$\frac{\pi}{3} + \frac{\pi}{3}$	$\frac{2\pi}{3}$	-4 - 3	-7
$\frac{2\pi}{3} + \frac{\pi}{3}$	π	0 - 3	-3
$\frac{4\pi}{3} + \frac{\pi}{3}$	$\frac{5\pi}{3}$	4 - 3	1
$\frac{5\pi}{3} + \frac{\pi}{3}$	2π	0 - 3	-3

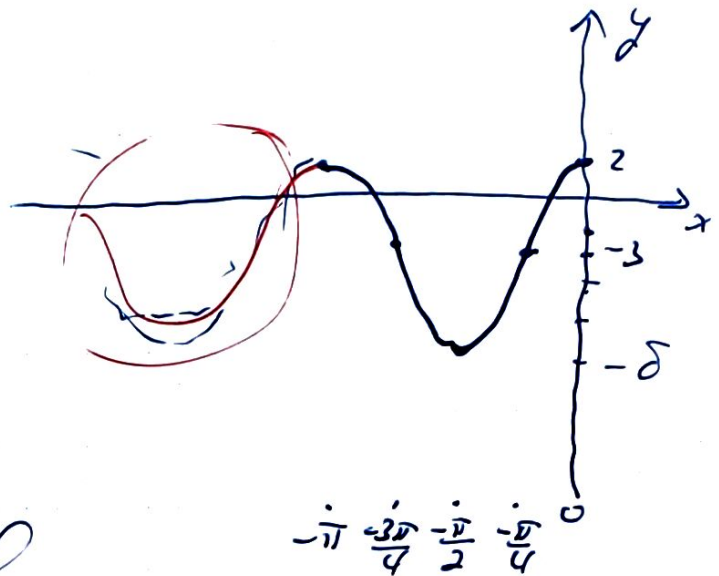
amplitude 4
vertical shift -3



#27 $y = 5 \cos(2x + 2\pi) - 3$

$|A| = 5$ $P = \frac{2\pi}{2} = \pi$ $\phi = -\frac{2\pi}{2} = -\pi$ $\text{VT: } y = -3$

	X		y
$0 - \pi$	$-\pi$	$5 - 3$	2
$\frac{\pi}{4} - \pi$	$-\frac{3\pi}{4}$	$0 - 3$	-3
$\frac{\pi}{2}$	$-\frac{\pi}{2}$	$-5 - 3$	-8
$\frac{3\pi}{4}$	$-\frac{\pi}{4}$	$0 - 3$	-3
π	0	$5 - 3$	2



1-Cycle