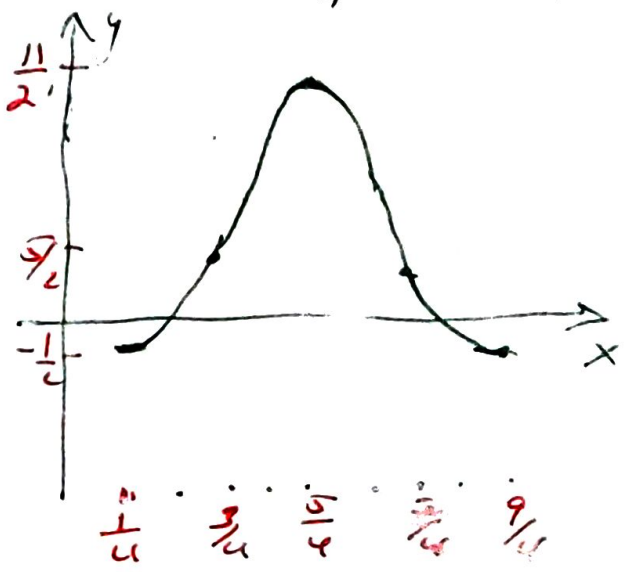
#11. $y = \frac{5}{2} - 3\cos\left(\pi x - \frac{\pi}{4}\right)$

7.1

amplitude | period | Phase shift | V.T. V.T.

$|A| = 3$ $\quad P = \frac{2\pi}{\pi} = 2$ $\quad \phi = +\frac{\pi}{4}\cdot\frac{1}{\pi} = \frac{1}{4}$ $\quad y = \frac{5}{2}$

	x		y
$0 + \frac{1}{4}$	$\frac{1}{4}$	$-3 + \frac{5}{2}$	$-\frac{1}{2}$
$\frac{1}{2} + \frac{1}{4}$	$\frac{3}{4}$	$0 + \frac{5}{2}$	$\frac{5}{2}$
1	$\frac{5}{4}$	$3 + \frac{5}{2}$	$\frac{11}{2}$
$\frac{3}{2}$	$\frac{7}{4}$	$0 + \frac{5}{2}$	$5/2$
2	$\frac{9}{4}$	$-3 + \frac{5}{2}$	$-\frac{1}{2}$

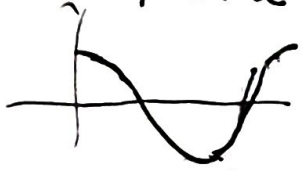


1-cycle

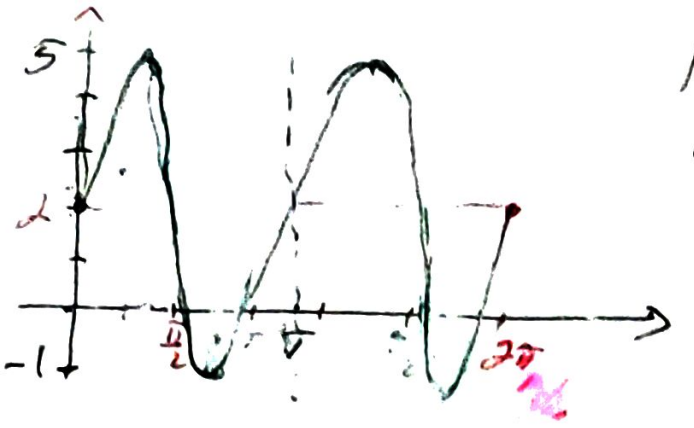
1-cycle
Period


+ sine


− sine


+ cosine


− cosine



$A\cos(Bx+C)+D$

$A\sin(Bx+C)+D$

$A = 3$

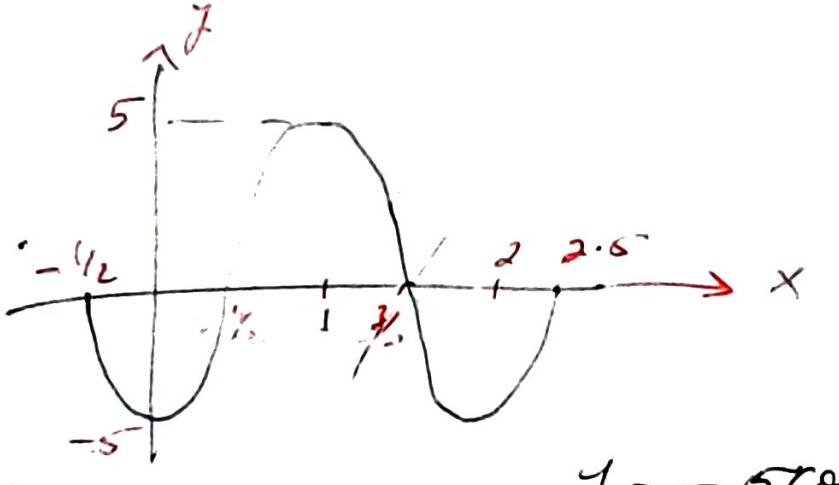
$P = \pi = \frac{2\pi}{B}$

$B = 2$ $\quad D = 2$

$C = 0$

$y = 3\sin 2x + 2$

$0 \le x \le 2\pi$



$|A| = 5$

$P = 2 = \frac{2\pi}{B} \Rightarrow B = \pi$

$C = 0$

$D = 0$

$y = -5\cos \pi x$

$-\frac{1}{2} \le x \le \frac{5}{2}$

$y = -5\sin\left(\pi x + \frac{\pi}{2}\right)$

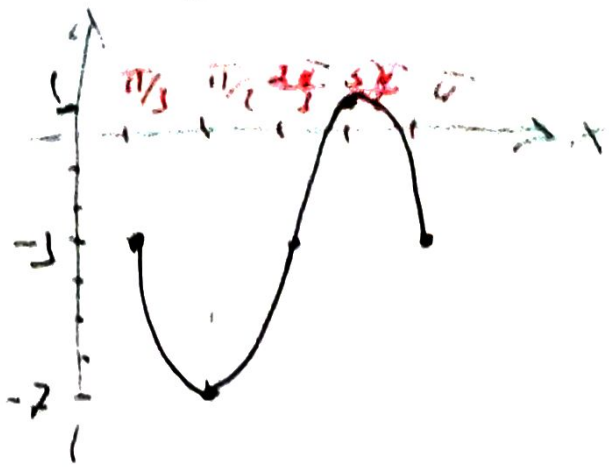
$+\frac{1}{2} = +\frac{C}{B} \Rightarrow C = \frac{\pi}{2}$

~~$\cos A = \sin(A + \frac{\pi}{2}) = \sin(\frac{\pi}{2} + B)$~~

H 2d) $y = -4\sin(3x - \pi) - 3$

$|A| = 4$ $\quad P = \frac{2\pi}{3}$ $\quad \phi = +\frac{\pi}{3}$ $\quad LT: y = -3$

	x		y
$0 + \frac{\pi}{3}$	$\frac{\pi}{3}$	$0 - 3$	-3
$\frac{\pi}{6} + \frac{\pi}{3}$	$\frac{\pi}{2}$	$-4 - 3$	-7
$\frac{\pi}{3}$	$\frac{4\pi}{3}$	$0 - 3$	-3
$\frac{\pi}{2}$	$\frac{5\pi}{6}$	$4 - 3$	1
$\frac{2\pi}{3}$	π	$0 - 3$	-3



Tangent

$$y = A\tan(Bx + C) + D$$

Domain: $x \neq (2n+1)\frac{\pi}{2}$

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

→ discontinuous @ $x = (2n+1)\frac{\pi}{2}$

→ No Amplitude → No Max, No Min.

- Period: $P = \frac{\pi}{|B|}$ (Period π)
- x intercept: $x = n\pi$

inside of any Trig → Argument (Arg)

$Bx + C$

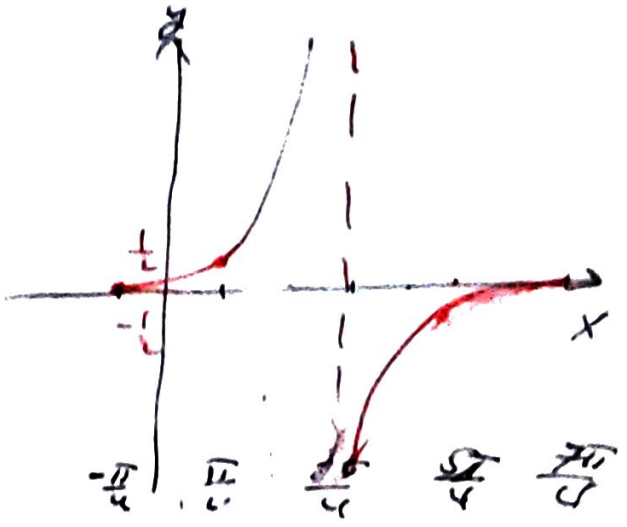
1 cycle: $0 \leq \text{argument} \leq \pi$

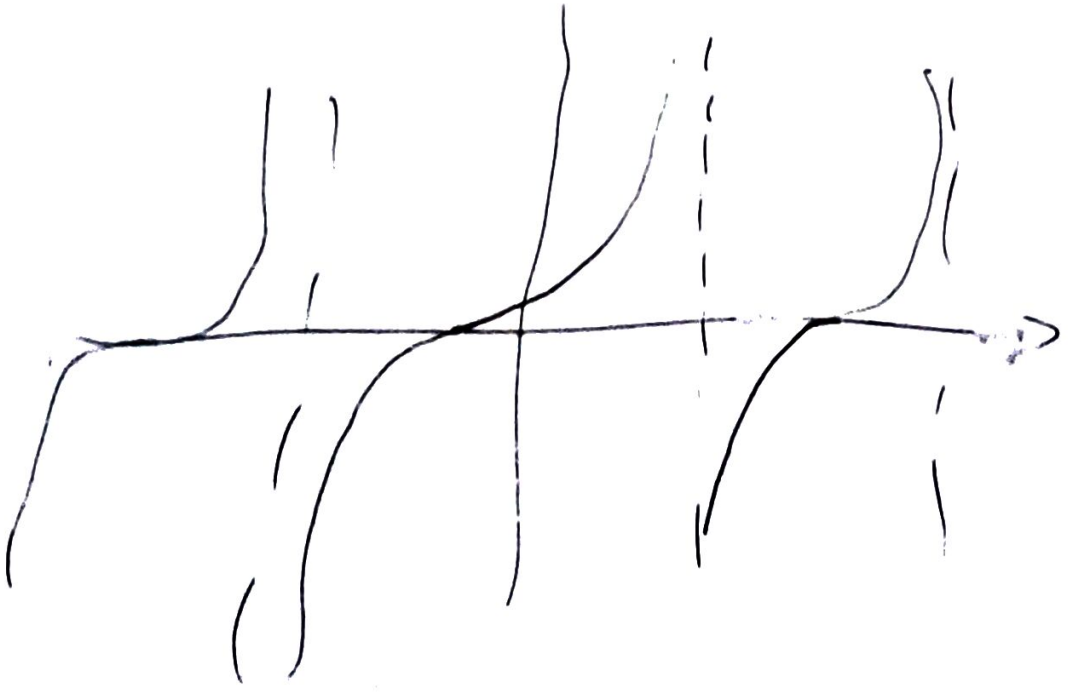
$$-\frac{\pi}{2} \leq \text{"} \leq \frac{\pi}{2}$$

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

$|A| = \frac{1}{2}$ $\quad$ none n/a $\quad$ $T = \frac{\pi}{1} = \pi$ $\quad$ $\phi = -\frac{\pi}{4}$ $\quad$ VA: $y = 0$

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

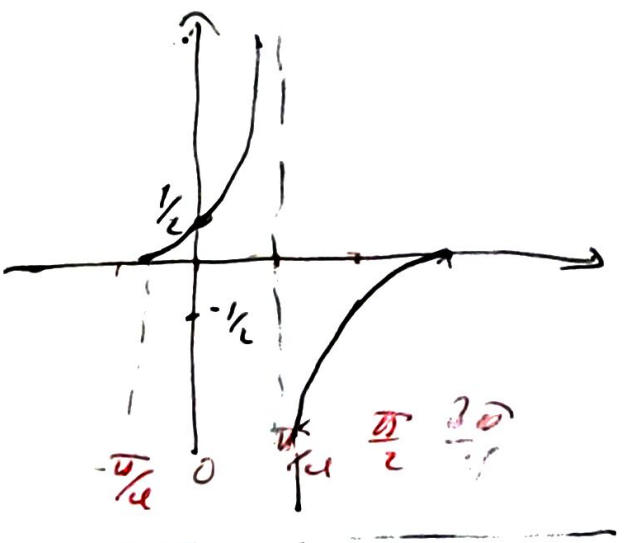




$$y = \frac{1}{2}\tan\left(x + \frac{\pi}{4}\right)$$

$|A| =$ none $\quad P = \pi \quad \phi = -\frac{\pi}{4} \quad VA: y = 0.$

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



$\frac{\cos}{\sin}$

Cotangent

Domain: $x \neq n\pi$

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

No Amplitude → No Max, No Min

Period is π → $P = \frac{\pi}{|B|}$

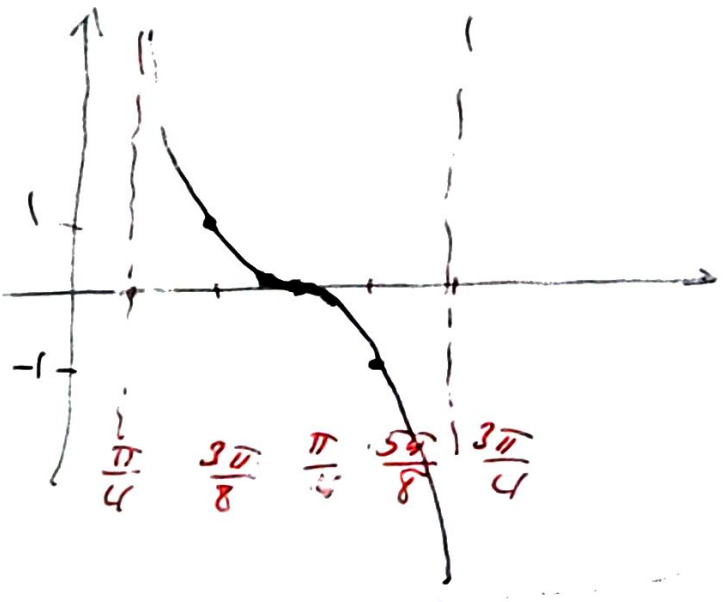
$\phi = -\frac{C}{B}$

x intercept: $x = (2n+1)\frac{\pi}{2}$

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

$|A| = n/a \quad P = \frac{\pi}{2} \quad \phi = \frac{\pi}{4} \quad VT: y = 0$

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



HWk $\begin{cases} y = 3 + 4\cos(3x - \pi) \\ y = 2 - 3\sin(2x + 3\pi) \end{cases}$

Amplitude, Period, Phase shift, Vertical T
Graph 1 cycle.

Due W. before Class

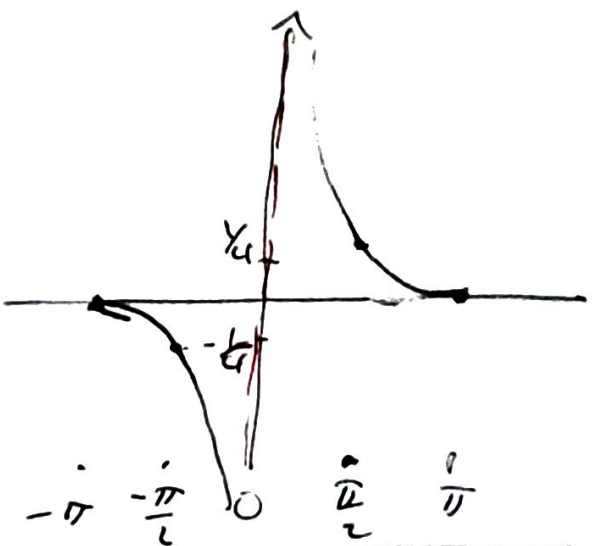
#3 7.2

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

HA: none $P = \frac{\pi}{1/2} = 2\pi$ $\phi = -\frac{\pi}{2}\cdot\frac{1}{\frac{1}{2}} = -\pi$

VT: $y = 0$

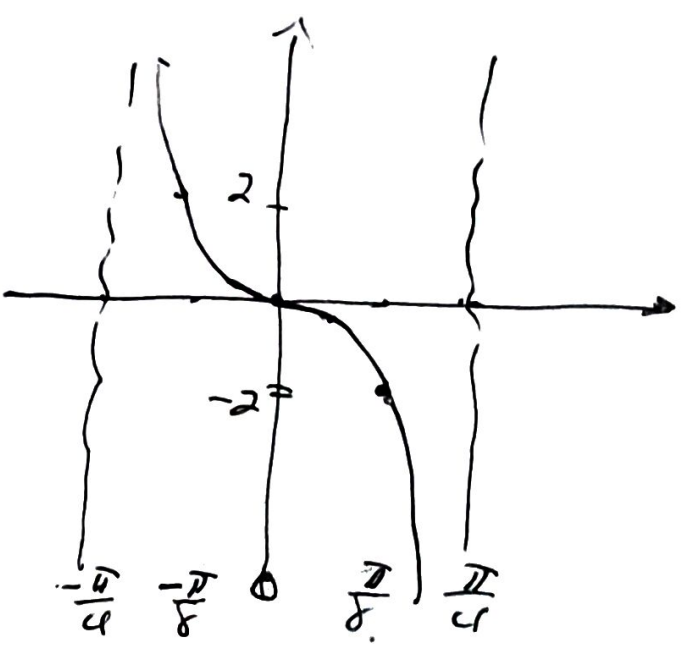
	x	y
$0 \quad -\pi$	$-\pi$	0
$\frac{\pi}{2} \quad -\pi$	$-\frac{\pi}{2}$	$-\frac{1}{4}$
π	0	∞
$\frac{3\pi}{2}$	$\frac{\pi}{2}$	$\frac{1}{4}$
2π	π	0



#5 $y = 2\cot\left(2x + \frac{\pi}{2}\right)$

HA: n/a $P = \frac{\pi}{2}$ $\phi = -\frac{\pi}{4}$ VT: $y = 0$

	x	y
$0 \quad -\frac{\pi}{4}$	$-\frac{\pi}{4}$	∞
$\frac{\pi}{8} \quad -\frac{\pi}{4}$	$-\frac{\pi}{8}$	2
$\frac{\pi}{4}$	0	0
$\frac{3\pi}{8}$	$\frac{\pi}{8}$	-2
$\frac{\pi}{2}$	$\frac{\pi}{4}$	∞



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

$|A| = n/a \quad P = 2\pi \quad \phi = -\frac{\pi}{4} \quad VA: y = 3.$

		x	y
0	$-\frac{\pi}{4}$	$-\frac{\pi}{4}$	3
$\frac{\pi}{2}$	$-\frac{\pi}{4}$	$\frac{\pi}{4}$	$2+3=5$
π	|	$\frac{3\pi}{4}$	∞
$\frac{3\pi}{2}$	|	$\frac{5\pi}{4}$	$-2+3=-1$
2π	↓	$\frac{7\pi}{4}$	3