$$y = A\sin(k\theta - c) + h$$
$$y = A\cos(k\theta - c) + h$$

Vert. Shift = h

Phase Shift = $\frac{c}{k}$

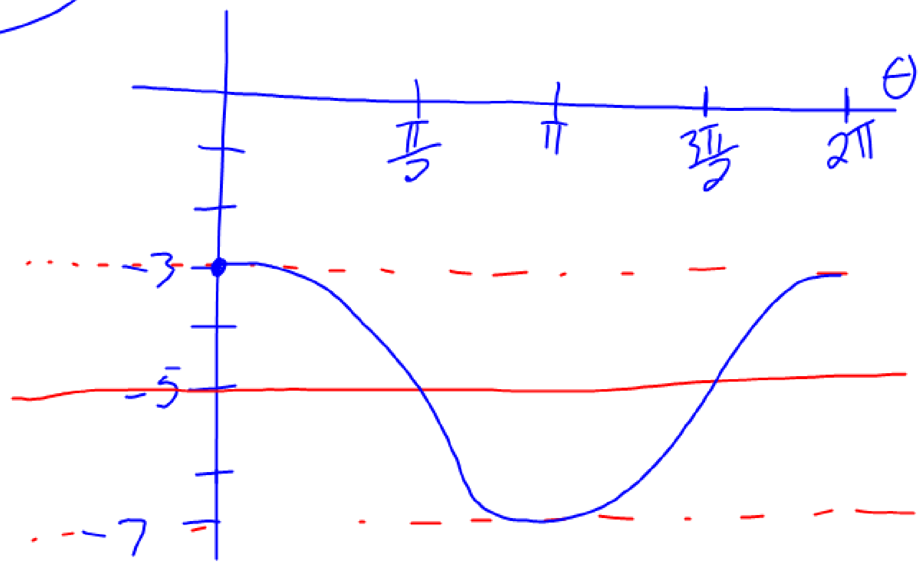
$c > 0$ right
$c < 0$ left

$$\underbrace{2}_{A}\cos\underbrace{1}_{k}\theta\ \underbrace{-5}_{h}$$

ex. 2 **State the vertical shift and the equation of the midline for the function $y = 2\cos\theta - 5$. Then graph the function.**

$A = 2$
$h = -5$
$k = 1$

Vert. Shift = -5
Ampl = 2
Per = 2π



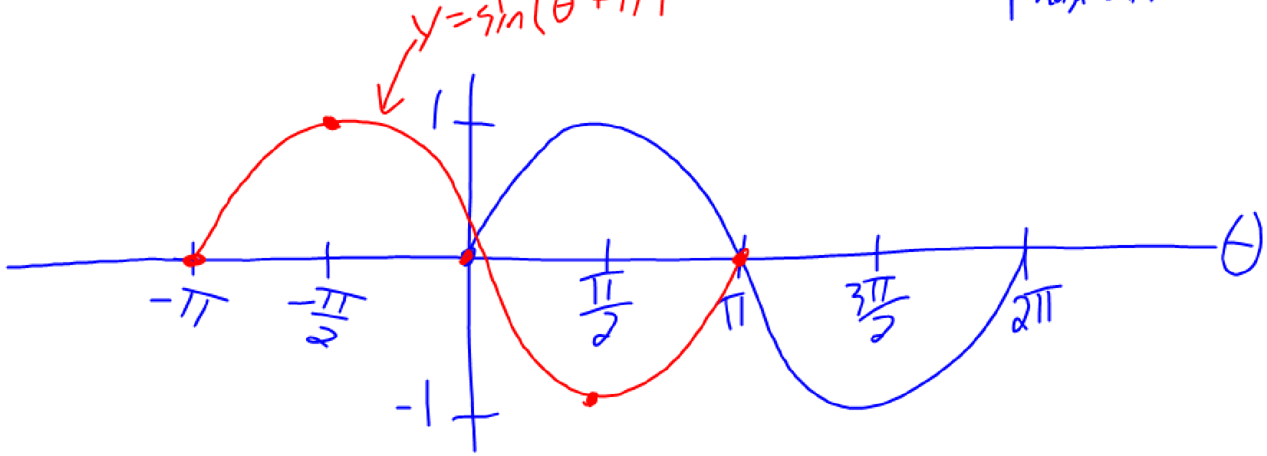
ex. 1A $y = \sin(\theta + \pi)$

$A = 1$ $\quad c = -\pi$

$K = 1$ $\quad h = 0$

Vert. Shift = 0 . Ampl = 1 Period = 2π

Phase Shift $= \frac{-\pi}{1} = -\pi$

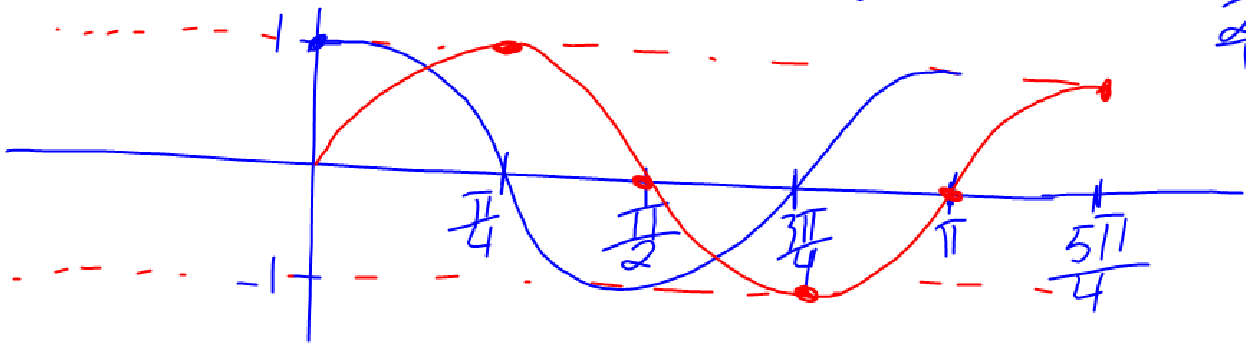


ex. 1b. $y = \cos\left(2\theta - \frac{\pi}{2}\right)$

$A = 1$ $\quad c = \frac{\pi}{2}$

$K = 2$ $\quad h = 0$

V.S. = 0 Ampl = 1 Period $= \frac{2\pi}{2} = \pi$ P.S. $= \frac{\pi/2}{\frac{2}{1}} = \frac{\pi}{4}$

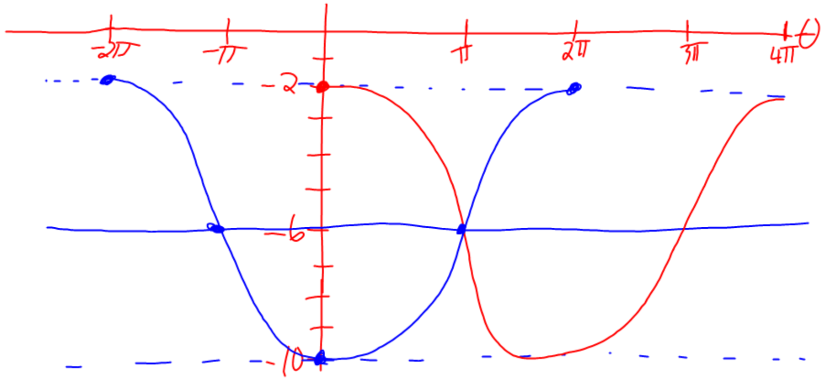


$$y = 4\cos\left(\frac{\theta}{2} + \pi\right) - 6.$$

$A = 4$ $\quad C = -\pi$

$K = \frac{1}{2}$ $\quad h = -6$

V.S. $= -6$ $\quad$ Ampl. $= 4$ $\quad$ Per $= \frac{2\pi}{1/2} = 4\pi$ $\quad$ P.S. $= \frac{-\pi}{1/2} = -2\pi$



p. 382 ex. 5

Write an equation of a sine function with amplitude 4, period π, phase shift $-\frac{\pi}{8}$, and vertical shift 6.

$y = A\sin(K\theta - c) + h$

$y = \pm 4\sin\left(2\theta + \frac{\pi}{4}\right) + 6$

Per $= \frac{2\pi}{K}$ $\quad$ P.S. $= \frac{c}{K}$

$\pi = \frac{2\pi}{K}$ $\quad$ $2\left(-\frac{\pi}{8}\right) = \frac{c}{2}(2)$

$K = 2$ $\quad$ $-\frac{2\pi}{8} = c$

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

$$h = 2.9 + 2.2\sin\left(\frac{\pi}{6.2}t - \frac{4.85\pi}{6.2}\right),$$

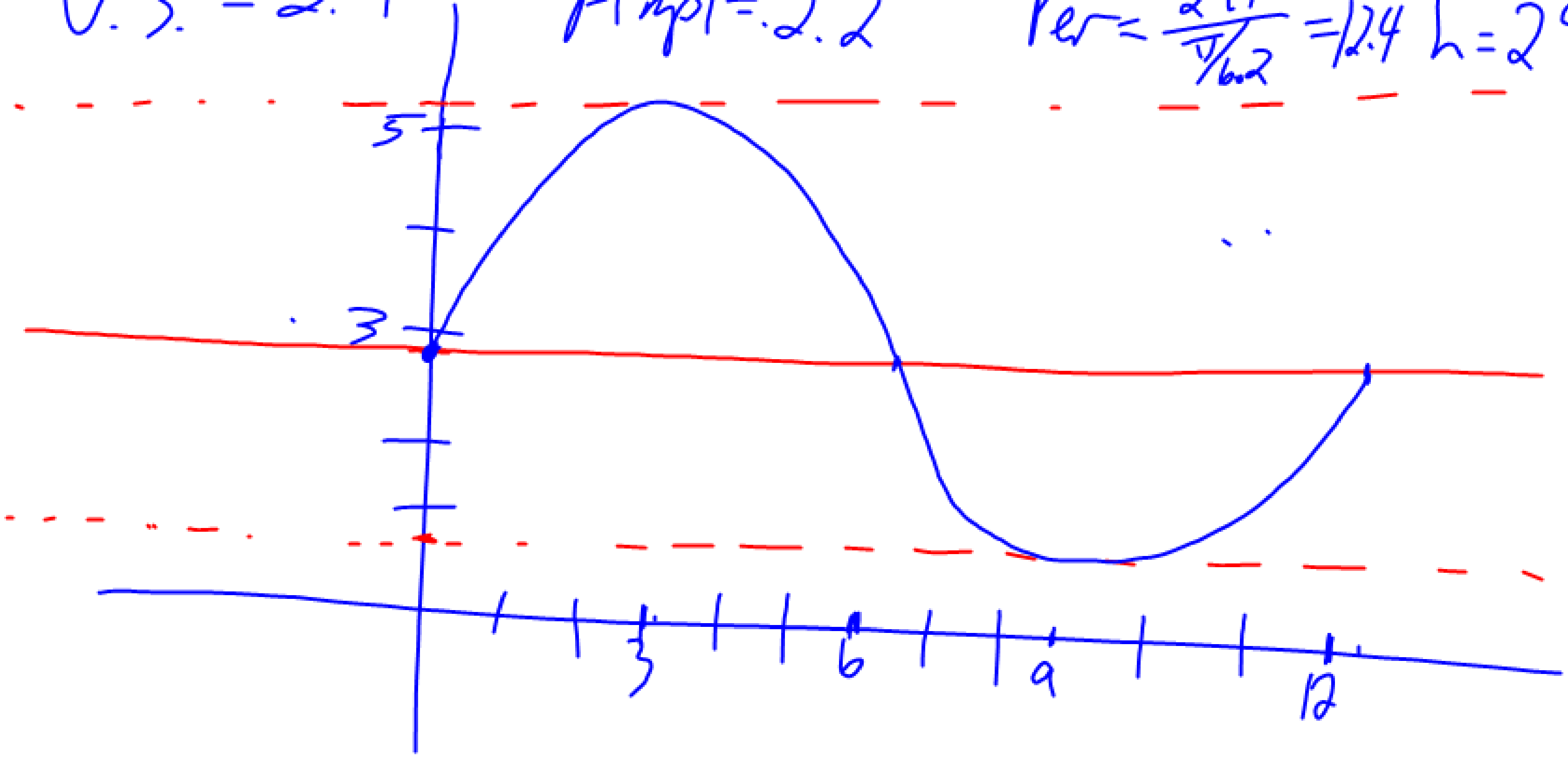
$A = 2.2$

$K = \frac{\pi}{6.2}$

$c = \frac{4.85\pi}{6.2}$

$h = 2.9$

V.S. = 2.9 Ampl = 2.2 Per = $\frac{2\pi}{\pi/6.2}$ = 12.4



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