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Quiz#3

1. Given the graph of $f(x)$ below, sketch the graph of

$$f(x) = 2 \sin \frac{x}{3} - 2$$

without the use of a graphing utility.

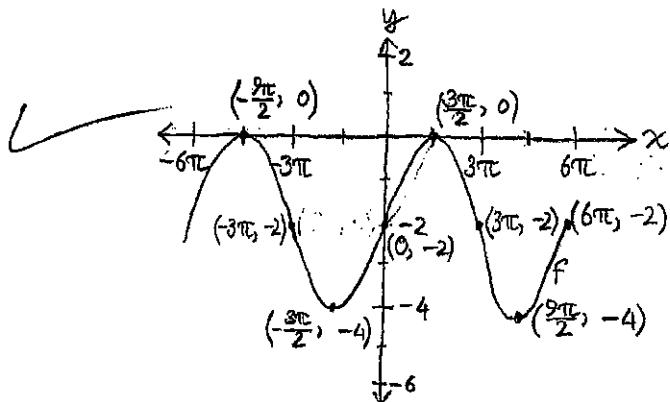
Period: $\frac{2\pi}{b}$; Period = $\frac{2\pi}{\frac{1}{3}} = 2\pi(3) = 6\pi$; Interval: $\frac{6\pi - 0}{4} = \frac{3\pi}{2}$

$$b = \frac{1}{3}$$

domain of f : $0 \leq \frac{x}{3} \leq 2\pi$

$$\therefore 0 \leq x \leq 6\pi$$

x	$f(x) = 2 \sin \frac{x}{3} - 2$	(x, y)
$\frac{3\pi}{2}$	$f(\frac{3\pi}{2}) = 2 \sin \frac{3\pi}{2}(\frac{1}{3}) - 2$ $= 2(1) - 2$ $= 0$	$(\frac{3\pi}{2}, 0)$
3π	$f(3\pi) = 2 \sin \frac{3\pi}{3} - 2$ $= 2(0) - 2 = -2$	$(3\pi, -2)$
$\frac{9\pi}{2}$	$f(\frac{9\pi}{2}) = 2 \sin \frac{9\pi}{2}(\frac{1}{3}) - 2$ $= 2 \sin \frac{3\pi}{2} - 2$ $= 2(-1) - 2 = -4$	$(\frac{9\pi}{2}, -4)$
6π	$f(6\pi) = 2 \sin \frac{6\pi}{3}(\frac{1}{3}) - 2$ $= 2 \sin 2\pi - 2$ $= 0 - 2 = -2$	$(6\pi, -2)$
0	$f(0) = 2 \sin \frac{0}{3} - 2$ $= 2 \sin 0 - 2$ $= 2(0) - 2 = -2$	$(0, -2)$
$-\frac{3\pi}{2}$	$f(-\frac{3\pi}{2}) = 2 \sin \frac{-3\pi}{2}(\frac{1}{3}) - 2$ $= 2(-1) - 2 = -4$	$(-\frac{3\pi}{2}, -4)$
-3π	$f(-3\pi) = 2 \sin \frac{-3\pi}{3} - 2$ $= 2 \sin -\pi - 2$ $= 2(0) - 2 = -2$	$(-3\pi, -2)$
$-\frac{9\pi}{2}$	$f(-\frac{9\pi}{2}) = 2 \sin \frac{-9\pi}{2}(\frac{1}{3}) - 2$ $= 2 \sin -\frac{3\pi}{2} - 2$ $= 2(1) - 2 = 0$	$(-\frac{9\pi}{2}, 0)$
-6π	$f(-6\pi) = 2 \sin \frac{-6\pi}{3} - 2$ $= 2(0) - 2 = -2$	$(-6\pi, -2)$



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2. Sketch the graph of the function below, being sure to include at least two full periods.

$$y = \sin\left(x + \frac{\pi}{4}\right)$$

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

$$\text{Interval: } \frac{2\pi - 0}{4} = \frac{\pi}{2}$$

$$\text{Domain: } 0 \leq x + \frac{\pi}{4} \leq 2\pi$$

$$\downarrow$$

$$-\frac{\pi}{4} \leq x \leq \frac{7\pi}{4}$$

$$x \quad y = \sin\left(x + \frac{\pi}{4}\right) \quad (x, y)$$

$$\frac{\pi}{4} \quad y = \sin\left(\frac{\pi + \pi}{4}\right) = \left(\frac{\pi}{4}, 1\right)$$

$$= \sin \frac{\pi}{2} = 1$$

$$\frac{3\pi}{4} \quad y = \sin\left(\frac{3\pi + \pi}{4}\right) = \left(\frac{3\pi}{4}, 0\right)$$

$$= \sin \pi = 0$$

$$\frac{5\pi}{4} \quad y = \sin\left(\frac{5\pi + \pi}{4}\right) = \left(\frac{5\pi}{4}, -1\right)$$

$$= \sin \frac{6\pi}{4} \rightarrow \sin \frac{3\pi}{2}$$

$$= -1$$

$$\frac{7\pi}{4} \quad y = \sin\left(\frac{7\pi + \pi}{4}\right) = \left(\frac{7\pi}{4}, 0\right)$$

$$= \sin \frac{8\pi}{4} \rightarrow \sin 2\pi$$

$$= 0$$

$$-\frac{\pi}{4} \quad y = \sin\left(\frac{-\pi + \pi}{4}\right) = \left(-\frac{\pi}{4}, 0\right)$$

$$= \sin 0 = 0$$

$$-\frac{3\pi}{4} \quad y = \sin\left(\frac{-3\pi + \pi}{4}\right) = \left(-\frac{3\pi}{4}, -1\right)$$

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

$$= -1$$

$$-\frac{5\pi}{4} \quad y = \sin\left(\frac{-5\pi + \pi}{4}\right) = \left(-\frac{5\pi}{4}, 0\right)$$

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

$$= 0$$

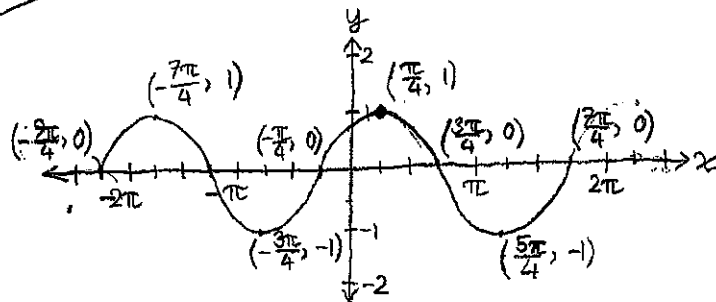
$$-\frac{7\pi}{4} \quad y = \sin\left(\frac{-7\pi + \pi}{4}\right) = \left(-\frac{7\pi}{4}, 1\right)$$

$$= \sin -\frac{6\pi}{4} = \sin -\frac{3\pi}{2}$$

$$= 1$$

$$-\frac{9\pi}{4} \quad y = \sin\left(\frac{-9\pi + \pi}{4}\right) = \left(-\frac{9\pi}{4}, 0\right)$$

$$= \sin -2\pi = 0$$



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3. Sketch the graph of the function below, being sure to include at least two full periods.

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

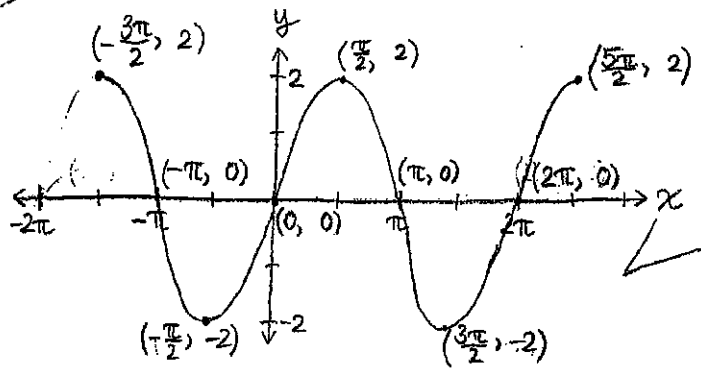
Period: 2π

Domain: $0 \leq x - \frac{\pi}{2} \leq 2\pi$

$$\frac{\pi}{2} \leq x \leq \frac{5\pi}{2} \rightarrow \frac{5\pi}{2}$$

$$\text{Interval: } \frac{2\pi - 0}{4} = \frac{\pi}{2}$$

x	$y = 2 \cos\left(x - \frac{\pi}{2}\right)$	(x, y)
$\frac{\pi}{2}$	$y = 2 \cos\left(\frac{\pi}{2} - \frac{\pi}{2}\right)$ $= 2 \cos(0) = 2(1) = 2$	$\left(\frac{\pi}{2}, 2\right)$
π	$y = 2 \cos\left(\pi - \frac{\pi}{2}\right)$ $= 2 \cos\frac{\pi}{2} = 2(0) = 0$	$(\pi, 0)$
$\frac{3\pi}{2}$	$y = 2 \cos\left(\frac{3\pi}{2} - \frac{\pi}{2}\right)$ $= 2 \cos\left(\frac{2\pi}{2}\right) = 2 \cos\pi$ $= 2(-1) = -2$	$\left(\frac{3\pi}{2}, -2\right)$
2π	$y = 2 \cos\left(2\pi - \frac{\pi}{2}\right)$ $= 2 \cos\frac{3\pi}{2} = 2(0) = 0$	$(2\pi, 0)$
$\frac{5\pi}{2}$	$y = 2 \cos\left(\frac{5\pi}{2} - \frac{\pi}{2}\right)$ $= 2 \cos\left(\frac{4\pi}{2}\right) = 2 \cos 2\pi$ $= 2(1) = 2$	$\left(\frac{5\pi}{2}, 2\right)$
$-\frac{\pi}{2}$	$y = 2 \cos\left(-\frac{\pi}{2} - \frac{\pi}{2}\right)$ $= 2 \cos(-\pi) = 2(-1) = -2$	$\left(-\frac{\pi}{2}, -2\right)$
0	$y = 2 \cos\left(0 - \frac{\pi}{2}\right)$ $= 2 \cos\left(-\frac{\pi}{2}\right)$ $= 2(0) = 0$	$(0, 0)$
$-\pi$	$y = 2 \cos\left(-\pi - \frac{\pi}{2}\right)$ $= 2 \cos\left(-\frac{3\pi}{2}\right) = 2(0) = 0$	$(-\pi, 0)$
$-\frac{3\pi}{2}$	$y = 2 \cos\left(-\frac{3\pi}{2} - \frac{\pi}{2}\right)$ $= 2 \cos\left(-\frac{4\pi}{2}\right) = -2\pi$ $= 2(1) = 2$	$\left(-\frac{3\pi}{2}, 2\right)$



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