

*Instructions: Work in groups of 2-3 students. You should fill out your own sheet.*

**1** Graph the function by noting the amplitude, period, phase shift, vertical shift, and whether the function is vertically flipped. Show at least 2 full periods with  $x$ -axis labels every  $\frac{1}{4}$  period.

(a)  $f(x) = \cos(x - \frac{\pi}{3})$

Amplitude \_\_\_\_\_

Period \_\_\_\_\_

Vertical Shift \_\_\_\_\_

Phase Shift \_\_\_\_\_ (relative to  $\cos x$ )

(b)  $f(x) = \frac{1}{5} \cos(\frac{x}{3})$

Amplitude \_\_\_\_\_

Period \_\_\_\_\_

Vertical Shift \_\_\_\_\_

Phase Shift \_\_\_\_\_ (relative to  $\frac{1}{5} \cos(\frac{x}{3})$ )

(c)  $f(x) = -2 \cos x + 1$

Amplitude \_\_\_\_\_

Period \_\_\_\_\_

Vertical Shift \_\_\_\_\_

Phase Shift \_\_\_\_\_ (relative to  $-2 \cos x$ )

(d)  $f(x) = -4 \cos(7x + 2) - 3$

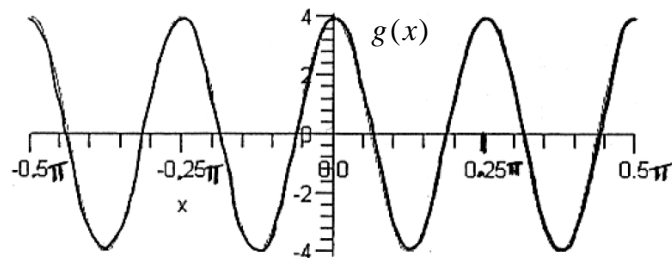
Amplitude \_\_\_\_\_

Period \_\_\_\_\_

Vertical Shift \_\_\_\_\_

Phase Shift \_\_\_\_\_ (relative to  $-4 \cos(7x) - 3$ )

**2** Consider the graph of the sinusoidal function  $g(x)$  shown. Depending on how you think of it, you might see it as a phase-shifted version of  $4\cos(8x)$ , or of  $4\sin(8x)$ .



(a) Give one possible phase shift of  $g(x)$  relative to  $4\cos(8x)$ : \_\_\_\_\_ (There is more than one correct answer.)

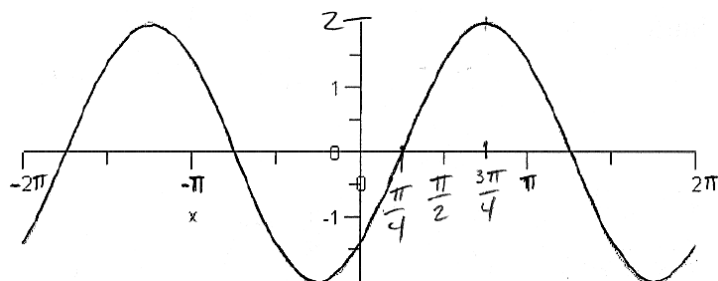
Write  $g(x)$  as a phase-shifted version of  $4\cos(8x)$ :  $g(x) = 4\cos(8(x - \quad))$

(b) Give one possible phase shift of  $g(x)$  relative to  $4\sin(8x)$ : \_\_\_\_\_ (There is more than one correct answer.)

Write  $g(x)$  as a phase-shifted version of  $4\sin(8x)$ :  $g(x) = 4\sin(8(x - \quad))$

**3** Give a formula for the sinusoidal functions shown. Pay close attention to the axes.

(a)



(b)

