4.4 Assignment

Describe how the graphs of $f(x)$ and $g(x)$ are related. Then find the amplitude of $g(x)$, and sketch two periods of both functions on the same coordinate axes. (Examples 1 and 2)

1. $f(x) = \sin x$
   $g(x) = \frac{1}{2}\sin x$
2. $f(x) = \cos x$
   $g(x) = -\frac{1}{3}\cos x$
3. $f(x) = \cos x$
   $g(x) = 6\cos x$
4. $f(x) = \sin x$
   $g(x) = -8\sin x$

Describe how the graphs of $f(x)$ and $g(x)$ are related. Then find the period of $g(x)$, and sketch at least one period of both functions on the same coordinate axes. (Example 3)

5. $f(x) = \sin x$
   $g(x) = \sin 4x$
6. $f(x) = \cos x$
   $g(x) = \cos 2x$
7. $f(x) = \cos x$
   $g(x) = \cos \frac{1}{5}x$
8. $f(x) = \sin x$
   $g(x) = \sin \frac{1}{4}x$

9. **VOICES** The contralto vocal type includes the deepest female singing voice. Some contraltos can sing as low as the E below middle C (E3), which has a frequency of 165 hertz. Write an equation for a sine function that models the initial behavior of the sound wave associated with E3 having an amplitude of 0.15. (Example 4)

Write a sine function that can be used to model the initial behavior of a sound wave with the frequency and amplitude given. (Example 4)

10. $f = 440, a = 0.3$
11. $f = 932, a = 0.25$
12. $f = 1245, a = 0.12$
13. $f = 623, a = 0.2$

State the amplitude, period, frequency, phase shift, and vertical shift of each function. Then graph two periods of the function. (Examples 5 and 6)

14. $y = 3\sin\left(x - \frac{\pi}{4}\right)$
15. $y = \cos\left(\frac{x}{3} + \frac{\pi}{2}\right)$
16. $y = 0.25\cos x + 3$
17. $y = \sin 3x - 2$
18. $y = \cos\left(x - \frac{3\pi}{2}\right) - 1$
19. $y = \sin\left(x + \frac{5\pi}{6}\right) + 4$

21. TIDES The table shown below provides data for the first high and low tides of the day for a certain bay during one day in June. (Example 7)

Tide	Height (ft)	Time
first high tide	12.95	4:25 A.M.
first low tide	2.02	10:55 A.M.

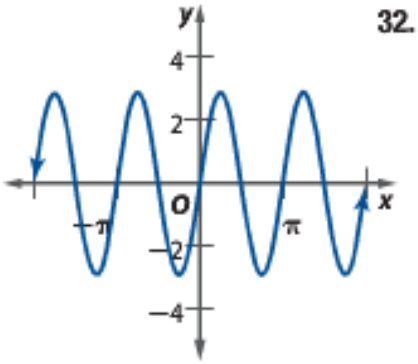
a. Determine the amplitude, period, phase shift, and vertical shift of a sinusoidal function that models the height of the tide. Let x represent the number of hours that the high or low tide occurred after midnight.

b. Write a sinusoidal function that models the data.

c. According to your model, what was the height of the tide at 8:45 P.M. that night?

Write an equation that corresponds to each graph.

31.



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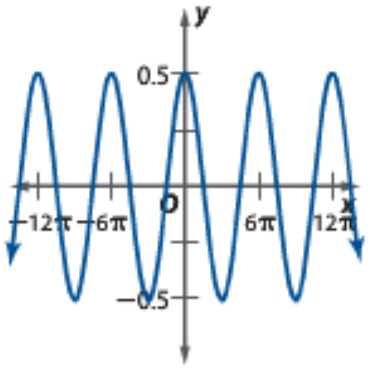

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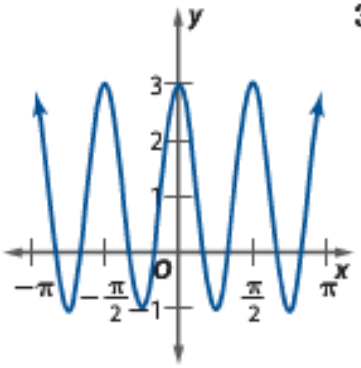

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