Advanced Algebra
Homework 6.6
Graphing Sine and Cosine Functions

Name _____

Period _____

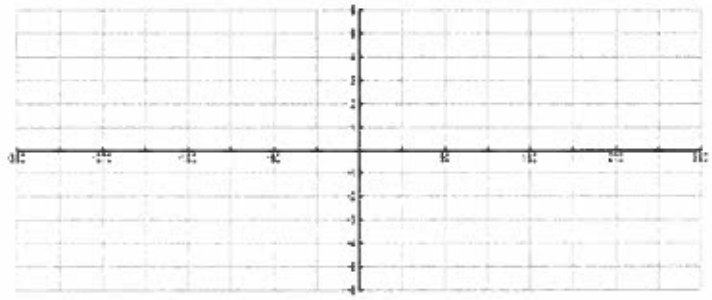
SHOW ALL WORK.

Complete Parts A & B OR Parts B & C

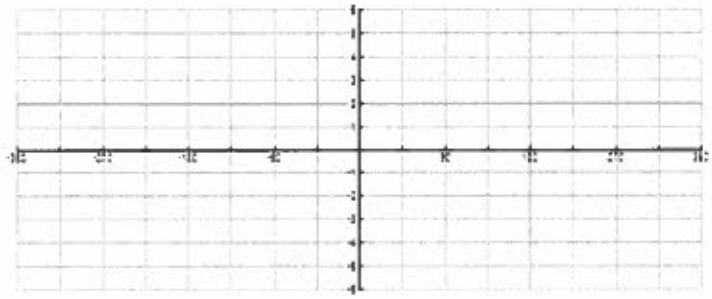
PART A:

Graph the function.

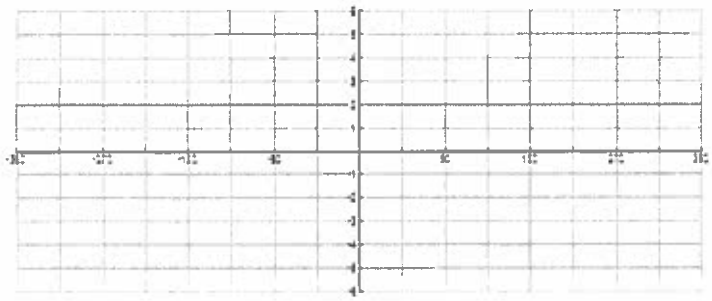
1. $y = 4\cos x$



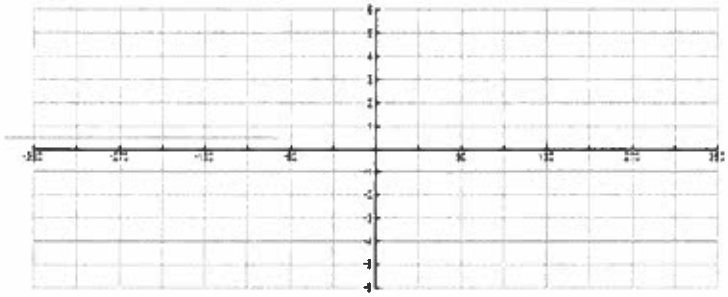
2. $y = \sin x + 3$



3. $f(x) = \sin(x + 90^\circ)$



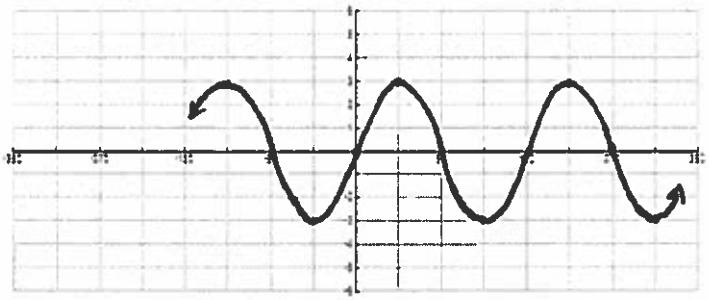
4. $y = -\sin x + 2$



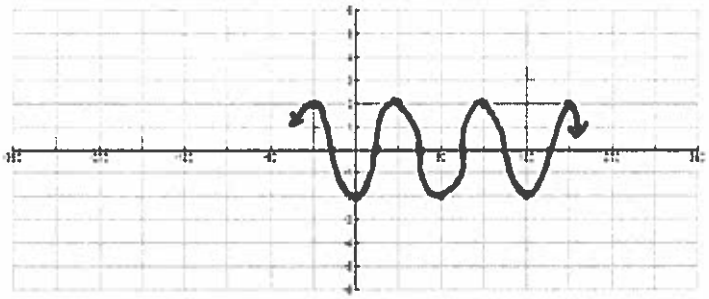
PART B:

Identify the amplitude and period of the function.

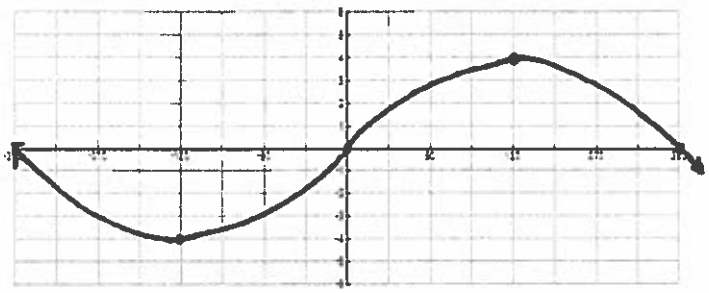
5. Amplitude: ____ Period: ____



6. Amplitude: ____ Period: ____

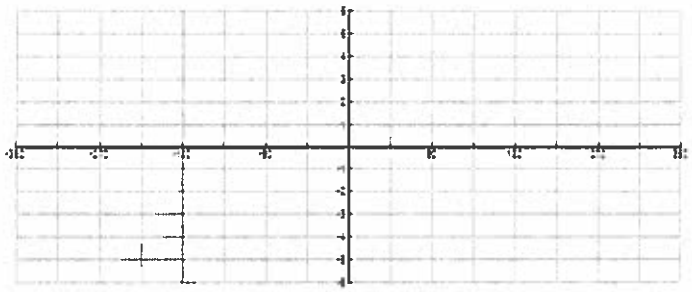


7. Amplitude: ____ Period: ____

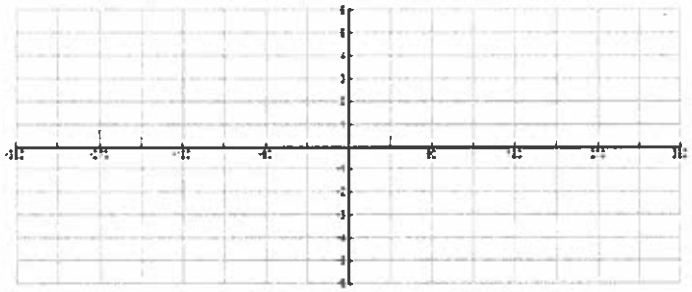


Graph the function.

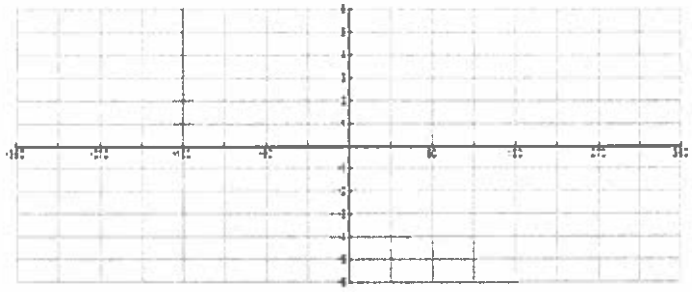
8. $f(x) = \sin 4^\circ x$



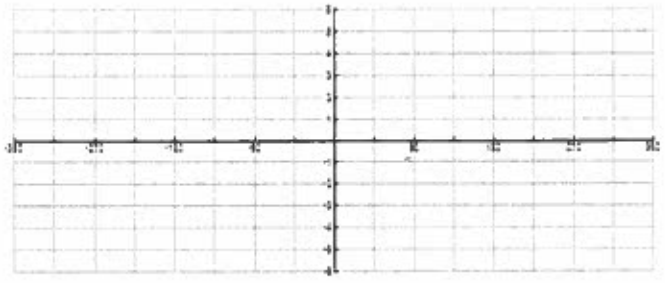
9. $y = 5\sin(x - 270^\circ)$



10. $y = -2\cos\frac{1}{4}x$



11. $f(x) = -\cos(x + 180^\circ) + 1$



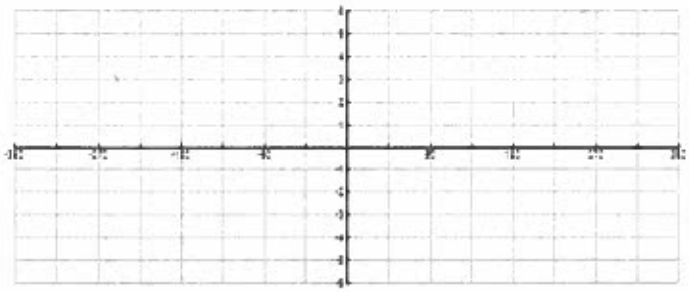
12. Write an equation for a sine function with an amplitude of 4 and a period of 2.

13. The motion of a certain pendulum can be modeled by the function $d = 4\cos 180^{\circ} t$ where d is the pendulum's horizontal displacement (in inches) relative to its position at rest and t is the time (in seconds). Graph the function. What is the greatest horizontal distance the pendulum will travel from its position at rest?

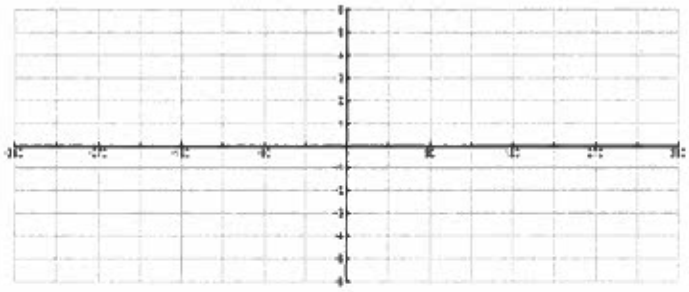
PART C:

Graph the function.

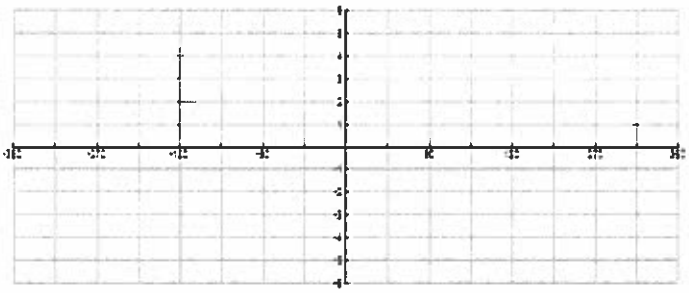
14. $y = \frac{\pi}{4}\cos x$



15. $y = -\cos 2x - 2$



16. $y = \cos\frac{2}{5}x$



17. In a particular region, the population C of coyotes (the predator) and the population R of rabbits (the prey) can be modeled by: $C = 9000 + 3000\sin 15^\circ t$ and $R = 20{,}000 + 8000\cos 15^\circ t$ where t is the time in months.

a. Determine the ratio of rabbits to coyotes when t = 0, 6, 12 and 18 months.

b. Graph both functions together on your graphing calculator. Make a sketch of what you see.

c. Use the graphs to explain how the changes in the two populations appear to be related.

18. A buoy oscillates up and down as waves go past. The buoy moves a total of 3.5 feet from its low point to its high point, and then returns to its high point every 6 seconds.

a. Write an equation that gives the buoy's vertical position y at time t if the buoy is at its highest point when $t = 0$.

b. Explain why you chose a cosine function instead of a sine function for the equation in part **a.**

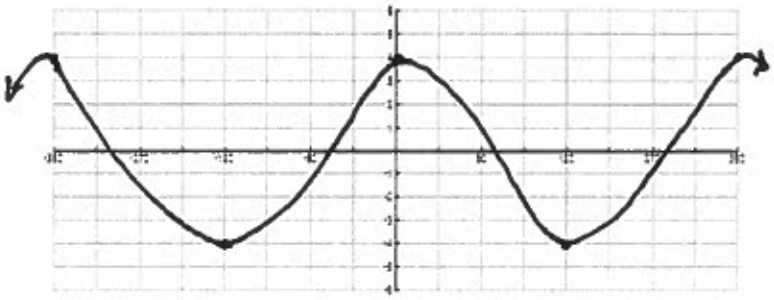
19. The motion of a spring can be modeled by $y = A\cos kt$ where y is the spring's vertical displacement (in feet) relative to its position at rest, A is the initial displacement (in feet), k is a constant that measures the elasticity of the spring, and t is the time (in seconds).

a. Suppose you have a spring whose motion can be modeled by the function $y = 0.2\cos 6t$. Find the initial displacement and the period of the spring. Then graph the given function.

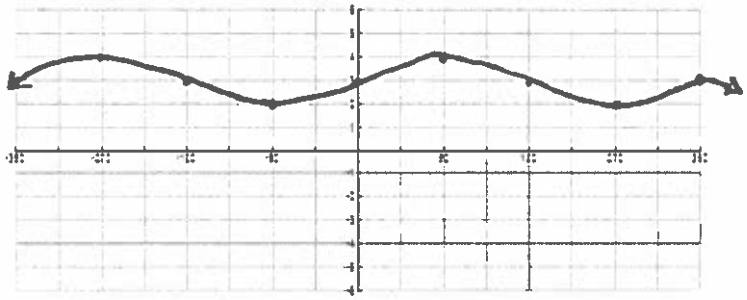
b. If a damping force is applied to the spring, the motion of the spring can be modeled by the function $y = 0.2e^{-4.5t}\cos 4t$. Graph this function. What effect does damping have on the motion?

Unit 6.6 Homework Answers

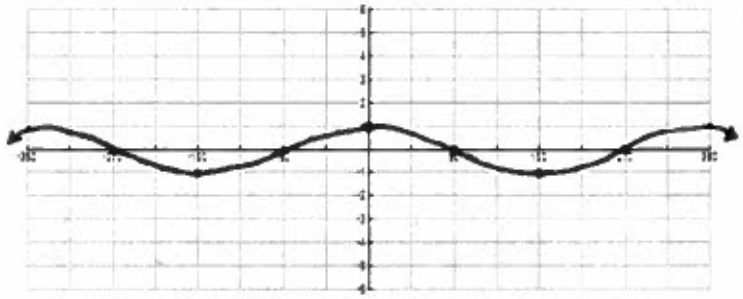
1. $y = 4\cos x$



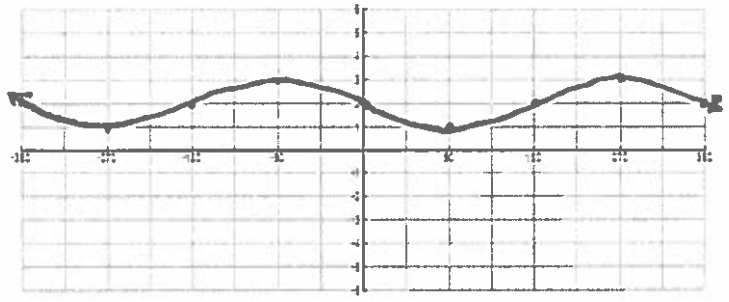
2. $y = \sin x + 3$



3. $f(x) = \sin(x + 90^\circ)$



4. $y = -\sin x + 2$



PART B:

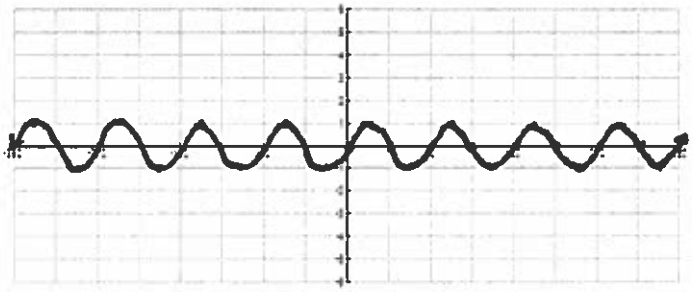
Identify the amplitude and period of the function.

5. Amplitude: 3 Period: 180°

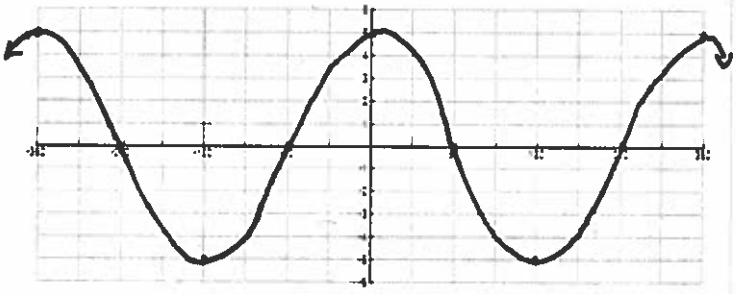
6. Amplitude: 2 Period: 90°

7. Amplitude: 4 Period: 720°

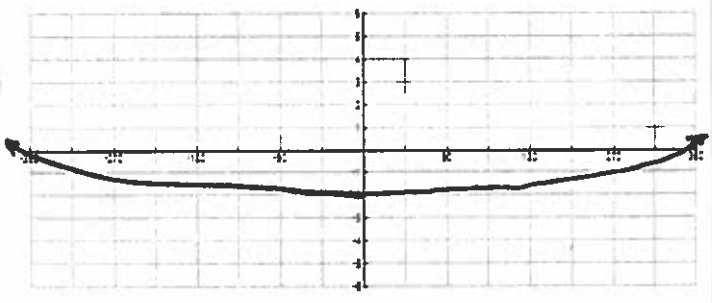
8. $f(x) = \sin 4^{\circ} x$



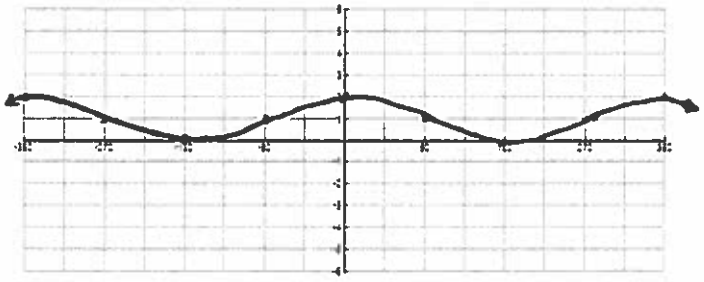
9. $y = 5\sin(x - 270^{\circ})$



10. $y = -2\cos\frac{1}{4}x$

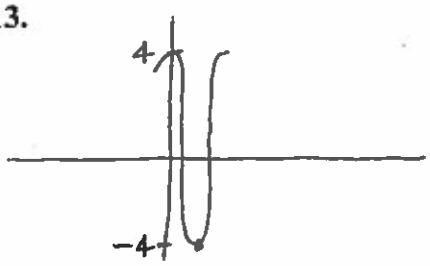


11. $f(x) = -\cos(x + 180^\circ) + 1$



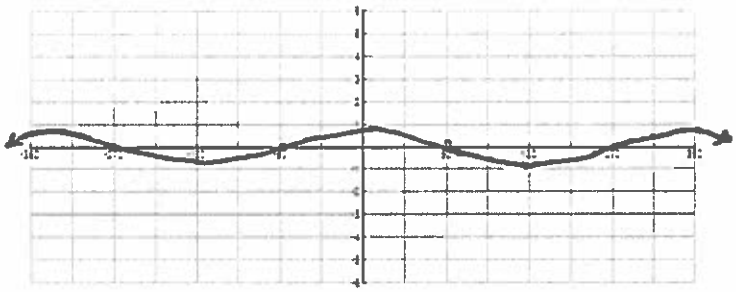
12. $y = 4\sin 180x$ OR $y = -4\sin 180x$

13.

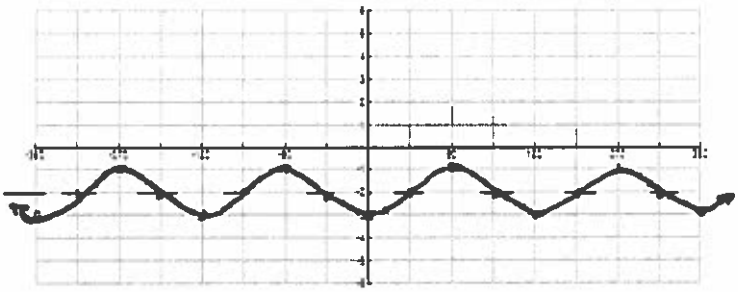


8 inches

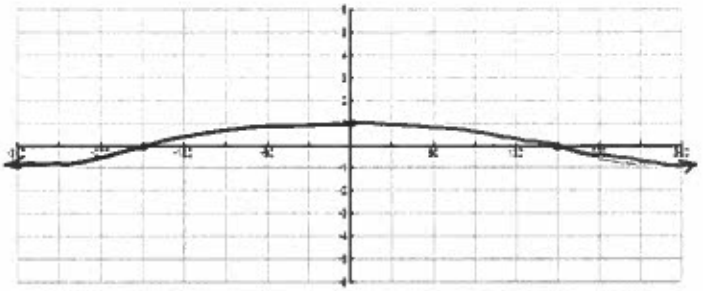
14. $y = \frac{\pi}{4}\cos x$



15. $y = -\cos 2x - 2$



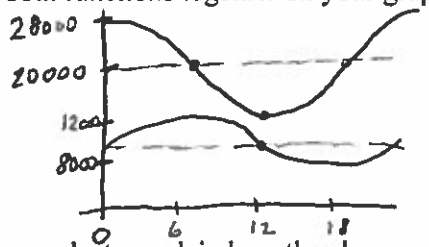
16. $y = \cos\frac{2}{5}x$ period = 900°



17a. Determine the ratio of rabbits to coyotes when t = 0, 6, 12 and 18 months.

$t=0$	$t=6$	$t=12$	$t=18$
$\frac{28}{9}$	$\frac{5}{3}$	$\frac{4}{3}$	$\frac{10}{3}$

b. Graph both functions together on your graphing calculator. Make a sketch of what you see.



c. Use the graphs to explain how the changes in the two populations appear to be related.

When # of coyotes increases, the number of rabbits decreases.
When # of coyotes decrease, the rabbit population increases.

18a. Write an equation that gives the buoy's vertical position y at time t if the buoy is at its highest point when $t = 0$.

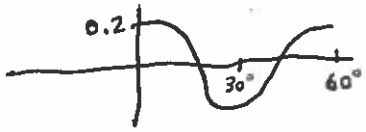
$y = 1.75 \cos 60° t.$

b. Explain why you chose a cosine function instead of a sine function for the equation in part a.

The maximum height is when $t = 0$.

19 a. Suppose you have a spring whose motion can be modeled by the function $y = 0.2\cos 6t$. Find the initial displacement and the period of the spring. Then graph the given function.

↳ 0.2 ↳ 60°



b. If a damping force is applied to the spring, the motion of the spring can be modeled by the function $y = 0.2e^{-4.5t}\cos 4t$. Graph this function. What effect does damping have on the motion?

The function is no longer periodic.