

Student: _____
Date: _____
Time: _____

Instructor: Andy Davis
Course: MATH 130 -
TRIGONOMETRY (4 UNITS) Fall
2008
Book: Sullivan: Trigonometry: A Unit
Circle Approach, 8e

Assignment: Homework 4: Graphs plus

1.

The point given below is on the terminal side of an angle θ . Find the exact values of the six trigonometric functions of θ .

$(12, -9)$

$\sin \theta =$ (Type a simplified fraction.)

$\cos \theta =$ (Type a simplified fraction.)

$\tan \theta =$ (Type a simplified fraction.)

$\cot \theta =$ (Type a simplified fraction.)

$\sec \theta =$ (Type a simplified fraction.)

$\csc \theta =$ (Type a simplified fraction.)

2.

The point given below is on the terminal side of an angle θ . Find the exact values of the six trigonometric functions of θ .

$(6, -7)$

$\sin \theta =$ (Type a simplified fraction. Rationalize the denominator.)

$\cos \theta =$ (Type a simplified fraction. Rationalize the denominator.)

$\tan \theta =$ (Type a simplified fraction. Rationalize the denominator.)

$\cot \theta =$ (Type a simplified fraction. Rationalize the denominator.)

$\sec \theta =$ (Type a simplified fraction. Rationalize the denominator.)

$\csc \theta =$ (Type a simplified fraction. Rationalize the denominator.)

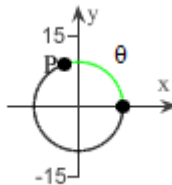
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3.

The point $P = (-3, 9)$ on the circle $x^2 + y^2 = r^2$ is also on the terminal side of an angle θ in standard position. Find $\sin \theta$, $\cos \theta$, $\tan \theta$, $\csc \theta$, $\sec \theta$, and $\cot \theta$.



$\sin \theta =$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

$\cos \theta =$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

$\tan \theta =$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

$\csc \theta =$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

$\sec \theta =$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

$\cot \theta =$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

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4.

A point on the terminal side of an angle θ in standard position is given. Find the exact values of the six trigonometric functions of θ .

$$(-8, -3)$$

$$\sin \theta = \square$$

(Type an exact answer, using radicals as needed. Rationalize all denominators. Type N if the function is undefined.)

$$\cos \theta = \square$$

(Type an exact answer, using radicals as needed. Rationalize all denominators. Type N if the function is undefined.)

$$\tan \theta = \square$$

(Type an exact answer, using radicals as needed. Rationalize all denominators. Type N if the function is undefined.)

$$\csc \theta = \square$$

(Type an exact answer, using radicals as needed. Rationalize all denominators. Type N if the function is undefined.)

$$\sec \theta = \square$$

(Type an exact answer, using radicals as needed. Rationalize all denominators. Type N if the function is undefined.)

$$\cot \theta = \square$$

(Type an exact answer, using radicals as needed. Rationalize all denominators. Type N if the function is undefined.)

5.

If $\sin \theta = 0.8$, find $\sin(\theta + \pi)$.

Type the value of $\sin(\theta + \pi)$.

$$\sin(\theta + \pi) = \square$$

6.

If $f(\theta) = \tan \theta = 7$, find $f(\theta + \pi)$.

$$f(\theta + \pi) = \square$$

(Type N if the answer is undefined.)

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7.

$f(\theta) = \sin(\theta)$, $g(\theta) = \cos(\theta)$. Find the exact value of the function $g\left(\frac{\theta}{5}\right)$ if $\theta = 300^\circ$.
Do not use a calculator.

$$g\left(\frac{\theta}{5}\right) = \square$$

(Type an exact answer, using radicals as needed. Rationalize all denominators. Type N if the function is undefined.)

8.

If $f(\theta) = \cos(\theta)$, find the exact value of the function below if $\theta = 60^\circ$. (Do not use a calculator.)

$$f(2\theta)$$

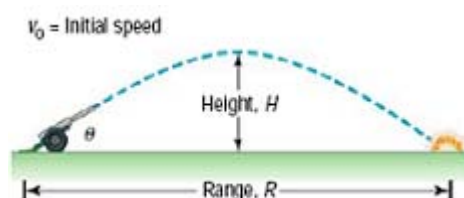
Type the exact value of $f(2\theta)$.

$$f(2\theta) = \square \text{ (Do not enter a decimal value and rationalize the denominator.)}$$

9.

The range R and the maximum height H of a projectile fired at an inclination θ to the horizontal with initial speed v_0 are given by the formulas below, where $g \approx 32.2$ feet per second per second is the acceleration due to gravity.

$$R(\theta) = \frac{v_0^2 \sin(2\theta)}{g} \quad H(\theta) = \frac{v_0^2 (\sin \theta)^2}{2g}$$



A. Find the range R if the projectile is fired at an angle of 45° to the horizontal with an initial speed of 40 feet per second.

$$R \approx \square \text{ feet (Round to two decimal places as needed.)}$$

B. Find the maximum height H if the projectile is fired at an angle of 45° to the horizontal with an initial speed of 40 feet per second.

$$H \approx \square \text{ feet (Round to two decimal places as needed.)}$$

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10. Use the fact that the trigonometric functions are periodic to find the exact value of the given expression. Do not use a calculator.

$$\cos(420^\circ)$$

$$\cos(420^\circ) = \square$$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

11. Use the fact that the trigonometric functions are periodic to find the exact value of the given expression. Do not use a calculator.

$$\cot(420^\circ)$$

$$\cot(420^\circ) = \square$$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

12. Use the fact that the trigonometric functions are periodic to find the exact value of the expression. Do not use a calculator.

$$\csc \frac{25\pi}{6}$$

$$\csc \frac{25\pi}{6} = \square$$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

13. Use the fact that the trigonometric functions are periodic to find the exact value of the given expression. Do not use a calculator.

$$\cot \frac{9\pi}{4}$$

$$\cot \frac{9\pi}{4} = \square$$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

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14.

Name the quadrant in which the angle θ lies.

$$\sin \theta < 0, \cos \theta > 0$$

The angle θ lies in which quadrant?

- III
- IV
- I
- II

15.

$\sin \theta$ and $\cos \theta$ are given. Find the exact value of each of the four remaining trigonometric functions.

$$\sin \theta = \frac{1}{7}, \cos \theta = -\frac{4\sqrt{3}}{7}$$

$$\csc \theta = \square$$

(Type an exact answer, using radicals as needed. Simplify your answer. Rationalize all denominators.)

$$\sec \theta = \square$$

(Type an exact answer, using radicals as needed. Simplify your answer. Rationalize all denominators.)

$$\tan \theta = \square$$

(Type an exact answer, using radicals as needed. Simplify your answer. Rationalize all denominators.)

$$\cot \theta = \square$$

(Type an exact answer, using radicals as needed. Simplify your answer. Rationalize all denominators.)

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16.

Find the exact value of each of the remaining trigonometric functions of θ .

$$\sin \theta = \frac{24}{25}, \theta \text{ in quadrant II}$$

$$\cos \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

$$\tan \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

$$\cot \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

$$\sec \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

$$\csc \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

17.

Find the exact value of each of the remaining trigonometric functions of θ .

$$\cos \theta = -\frac{4}{5}, \theta \text{ in quadrant II}$$

$$\sin \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

$$\tan \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

$$\cot \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

$$\sec \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

$$\csc \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

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18.

Find the exact value of each of the remaining trigonometric functions of θ .

$$\sin \theta = -\frac{7}{25}, 180^\circ < \theta < 270^\circ$$

$$\cos \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

$$\tan \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

$$\cot \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

$$\sec \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

$$\csc \theta = \square$$

(Type a simplified fraction. Rationalize the denominator if necessary.)

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19.

Find the exact value of each of the remaining trigonometric functions of θ .

$$\cos \theta = -\frac{6}{7}, \quad \pi < \theta < \frac{3\pi}{2}$$

$$\sin \theta = \square$$

(Type an exact answer, using radicals as needed. Rationalize the denominator if necessary.)

$$\tan \theta = \square$$

(Type an exact answer, using radicals as needed. Rationalize the denominator if necessary.)

$$\csc \theta = \square$$

(Type an exact answer, using radicals as needed. Rationalize the denominator if necessary.)

$$\sec \theta = \square$$

(Type an exact answer, using radicals as needed. Rationalize the denominator if necessary.)

$$\cot \theta = \square$$

(Type an exact answer, using radicals as needed. Rationalize the denominator if necessary.)

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20.

Find the exact value of each of the remaining trigonometric functions of θ .

$$\cos \theta = \frac{1}{2}, \cot \theta < 0.$$

$$\sin \theta = \square$$

(Type an exact answer, using radicals as needed. Simplify your answer. Rationalize all denominators.)

$$\cot \theta = \square$$

(Type an exact answer, using radicals as needed. Simplify your answer. Rationalize all denominators.)

$$\tan \theta = \square$$

(Type an exact answer, using radicals as needed. Simplify your answer. Rationalize all denominators.)

$$\sec \theta = \square$$

(Type an exact answer, using radicals as needed. Simplify your answer. Rationalize all denominators.)

$$\csc \theta = \square$$

(Type an exact answer, using radicals as needed. Simplify your answer. Rationalize all denominators.)

21.

Use the even-odd properties of the trigonometric functions to find the exact value of the given expression. Do not use a calculator.

$$\sin (-60^\circ)$$

$$\sin (-60^\circ) = \square$$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

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22.

Use the even-odd properties to find the exact value of the given expression. Do not use a calculator.

$$\sin(-180^\circ)$$

$$\sin(-180^\circ) = \square$$

(Type an exact answer, using radicals as needed. Simplify your answer, including any radicals. Type N if the answer is undefined.)

23.

Use the even-odd properties of the trigonometric functions to find the exact value of the given expression. Do not use a calculator.

$$\tan\left(-\frac{\pi}{4}\right)$$

$$\tan\left(-\frac{\pi}{4}\right) = \square$$

(Type an exact answer, using radicals as needed.)

24.

Use the even-odd properties of the trigonometric functions to find the exact value of the given expression. Do not use a calculator.

$$\sin\left(-\frac{\pi}{3}\right)$$

$$\sin\left(-\frac{\pi}{3}\right) = \square$$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

25.

Use properties of the trigonometric functions to find the exact value of the expression. Do not use a calculator.

$$\sin^2 70^\circ + \cos^2 70^\circ$$

$$\sin^2 70^\circ + \cos^2 70^\circ = \square$$

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26.

Use properties of the trigonometric functions to find the exact value of the expression.
Do not use a calculator.

$$\sin 62^\circ \cdot \csc 62^\circ$$

$$\sin 62^\circ \cdot \csc 62^\circ = \square$$

27.

Use fundamental identities and/or the complementary angle theorem to find the exact
value of the expression. Do not use a calculator.

$$\tan 44^\circ - \frac{\sin 44^\circ}{\cos 44^\circ}$$

$$\tan 44^\circ - \frac{\sin 44^\circ}{\cos 44^\circ} = \square$$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers
in the expression.)

28.

Use properties of the trigonometric functions to find the exact value of the expression.
Do not use a calculator.

$$\cos 404^\circ \sec 44^\circ$$

$$\cos 404^\circ \sec 44^\circ = \square$$

29.

If $\sin \theta = 0.5$, find the value of $\sin \theta + \sin (\theta + 2\pi) + \sin (\theta + 4\pi)$.

$$\sin \theta + \sin (\theta + 2\pi) + \sin (\theta + 4\pi) = \square \text{ (Type an integer or a decimal.)}$$

30.

If $\cot \theta = 4$, find the value of $\cot \theta + \cot (\theta + \pi) + \cot (\theta + 2\pi)$.

$$\cot \theta + \cot (\theta + \pi) + \cot (\theta + 2\pi) = \square \text{ (Simplify your answer.)}$$

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31.

What is the domain of the **cosecant** function?

Choose the correct answer below.

- A. All real numbers except integral multiples of $\frac{\pi}{2}$ (90°)
- B. All real numbers except integral multiples of π (180°)
- C. All real numbers
- D. All real numbers except odd multiples of $\frac{\pi}{2}$ (90°)

32.

For what numbers θ is $f(\theta) = \tan \theta$ not defined?

$f(\theta) = \tan \theta$ is not defined for numbers that are of .

33.

If $f(x) = \cos(x)$ and $f(a) = \frac{1}{4}$, find the exact value of the following.

- (a) $f(-a)$
(b) $f(a) + f(a + 2\pi) + f(a + 4\pi)$

(a) $f(-a) = \square$ (Type the value as a reduced fraction.)

(b) $f(a) + f(a + 2\pi) + f(a + 4\pi) = \square$ (Type the value as a reduced fraction.)

34.

If $f(x) = \tan(x)$ and $f(a) = 3$, find the exact value of the following.

- (a) $f(-a)$
(b) $f(a) + f(a + \pi) + f(a + 2\pi)$

(a) $f(-a) = \square$
(Simplify your answer. Use integers or fractions for any numbers in the expression.)

(b) $f(a) + f(a + \pi) + f(a + 2\pi) = \square$
(Simplify your answer. Use integers or fractions for any numbers in the expression.)

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35.

If necessary, refer to a graph to answer the question.

What is the y-intercept of $y = 2 \cos x$?

The y-intercept of $y = 2 \cos x$ is .
(Simplify your answer.)

36.

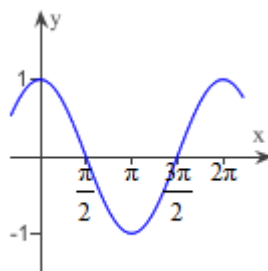
If necessary, refer to a graph to answer the question.

What is the **smallest** value of $y = \cos x$?

The **smallest** value of $y = \cos x$ is .
(Simplify your answer.)

37.

For what number x , $0 \leq x \leq 2\pi$, does
 $\cos x = 0$?



(Pick from the following possible answers: 0 , $\frac{\pi}{2}$, π , $\frac{3\pi}{2}$, 2π . Type all values, one per box, starting with the smallest value in the left box and working up. Enter N in any box without a value.)

38.

Determine the amplitude and period of the following function without graphing.

$$y = 7 \sin x$$

For the function given, the **amplitude** is .

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

For the function given, $\omega =$, so that **the period** = $T =$.

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

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39.

Determine the amplitude and period of the following function without graphing.

$$y = -4 \cos(5x)$$

The amplitude is .

The period is .

(Simplify your answer. Type an exact answer in terms of π . Use integers or fractions for any numbers in the expression.)

40.

Determine the amplitude and period of the following function without graphing.

$$y = 7 \cos(\pi x)$$

For the function given, the **amplitude** is .

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

For the function given, $\omega =$, so that the **period** = $T =$.

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

41.

Determine the amplitude and period of the following function without graphing.

$$y = -\frac{3}{7} \cos\left(\frac{7}{5}x\right)$$

For the function given, the **amplitude** is .

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

For the function given, $\omega =$, so that the **period** = $T =$.

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

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42.

Determine the amplitude and period of the function without graphing.

$$y = \frac{6}{5} \sin \left(-\frac{2\pi}{5}x \right)$$

What is the amplitude?

A = (Simplify your answer.)

What is the period?

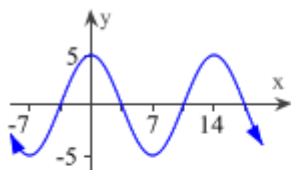
T = (Simplify your answer.)

43.

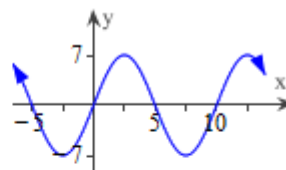
Match the function $y = 5 \cos \left(\frac{\pi}{7}x \right)$ to the correct graph.

Choose the correct graph below.

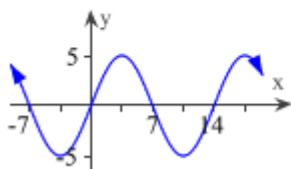
A.



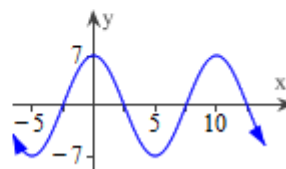
B.



C.



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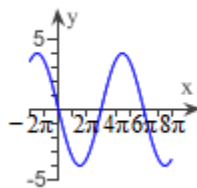
44.

Match the given function to one of the graphs.

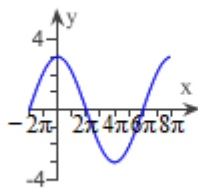
$$y = -4 \sin\left(\frac{1}{3}x\right)$$

Select the correct graph.

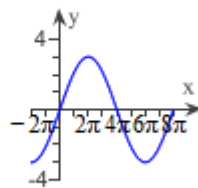
A.



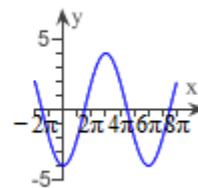
B.



C.



D.



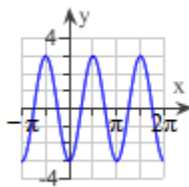
45.

Match the given function to one of the graphs.

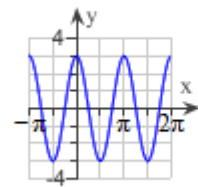
$$y = -3 \cos(2x)$$

Choose the correct graph below.

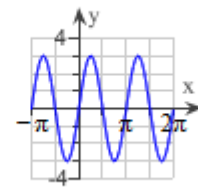
A.



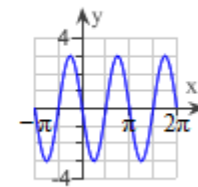
B.



C.



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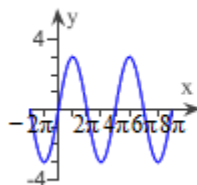
46.

Match the given function to one of the graphs.

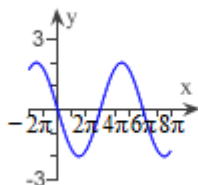
$$y = 3 \sin \left(\frac{1}{2}x \right)$$

Select the correct graph.

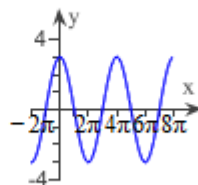
A.



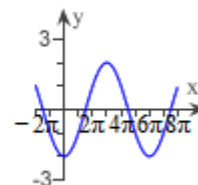
B.



C.



D.



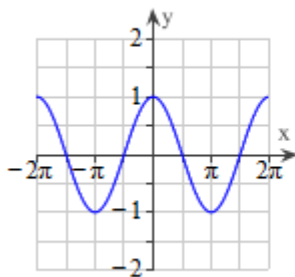
47.

Graph the following function. Show at least two cycles.

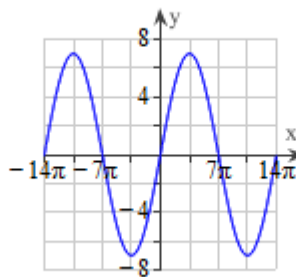
$$y = 7 \sin \left(\frac{1}{7}x \right)$$

Choose the correct graph of the function below.

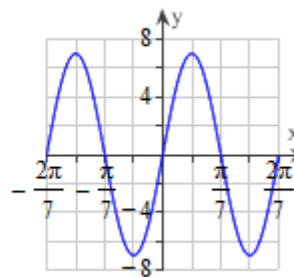
A.



B.



C.



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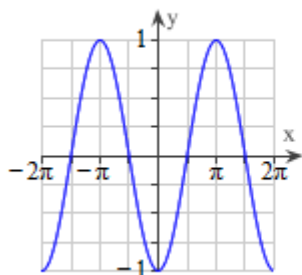
48.

Graph the following function. Show at least two cycles.

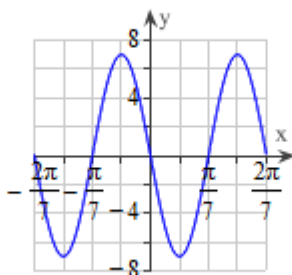
$$y = -\frac{1}{7} \sin(7x)$$

Choose the correct graph of the function below.

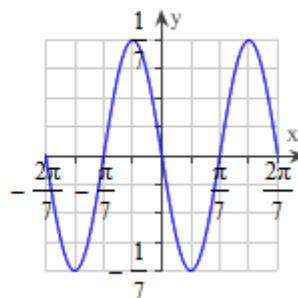
A.



B.



C.



49.

Write the equation of a sine function that has the given characteristics.

Amplitude: 2

Period: 8π

Choose the correct answer below.

$y = 8 \sin(2x)$

$y = 2 \sin\left(\frac{1}{4}x\right)$

$y = 2 \sin(4x)$

$y = 8 \sin(x)$

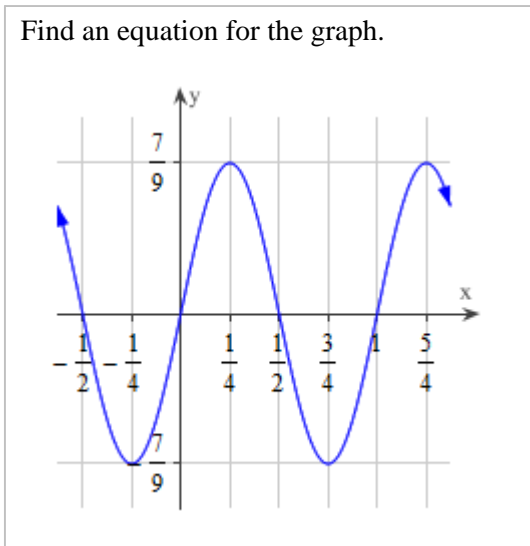
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50.

Find an equation for the graph.



Which is an equation for the graph?

- A. $y = \cos\left(\frac{7\pi}{9}x\right)$
- B. $y = \frac{7}{9} \cos(2\pi x)$
- C. $y = 2\pi \sin\left(\frac{7}{9}x\right)$
- D. $y = 2\pi \cos\left(\frac{7}{9}x\right)$
- E. $y = \sin\left(\frac{7\pi}{9}x\right)$
- F. $y = \frac{7}{9} \sin(2\pi x)$

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51.

The voltage V produced by an ac generator is $V = 120 \sin(120\pi t)$. Use this information to answer the questions below.

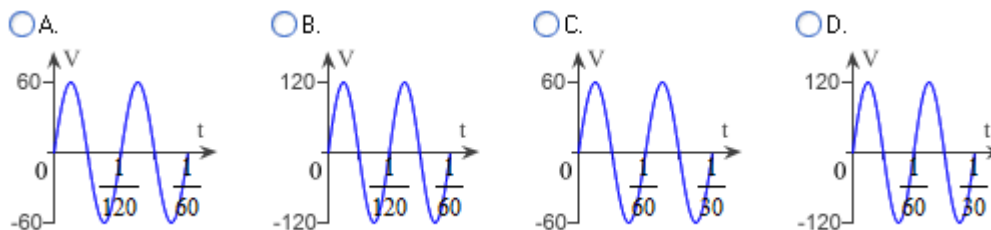
(a) What is the amplitude of the voltage V ?

The amplitude of the voltage is .

What is the period of the voltage V ?

$T =$ (Type an integer or a simplified fraction.)

(b) Which of the following shows a graph of the voltage V over two periods, beginning at $t = 0$?



(c) If a resistance $R = 90$ ohms is present, what is the current I ? [Hint: Use Ohm's Law, $V = IR$.]

$I =$ $\sin(120\pi t)$

(Round to the nearest tenth as needed.)

(d) What is the amplitude of the current I ?

The amplitude of the current is .

(Round to the nearest tenth as needed.)

What is the period of the current I ?

$T =$ (Type an integer or a simplified fraction.)

(e) Which of the following shows a graph of the current I over two periods, beginning at $t = 0$?

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51.
(cont.)

