

Math 108 Exam #2

Write the exact value in radians of the measure of an angle of  $260^\circ$ .

Write the exact value in degrees of the measure of an angle of 23 radians.

Find the degree measurement of the angle in standard position between  $0^\circ$  and  $360^\circ$  that has the same terminal side as an angle of  $-1874^\circ$ .

Find the radian measurement of the angle in standard position between  $0^r$  and  $2^r$  that has the same terminal side as an angle of  $(209\sqrt{12})^r$ .

If a clock has a minute hand that is 5.2 inches long, how far does the outside of the minute hand travel in 17.8 minutes?

If a clock has a minute hand that is 5.2 inches long, how much area does the minute hand sweep out in 17.8 minutes?

What is the angular speed of the rotation of the earth in degrees per minute?

If the diameter of the earth is about 8000 miles, what is the linear speed of a spot on the equator in feet per second?

What is the exact value of  $\sin^{-1}(y)$  if  $\sin(5\sqrt{7}) = y$ ?

What is the exact value of  $\cos^{-1}(x)$  if  $\cos(9\sqrt{7}) = x$ ?

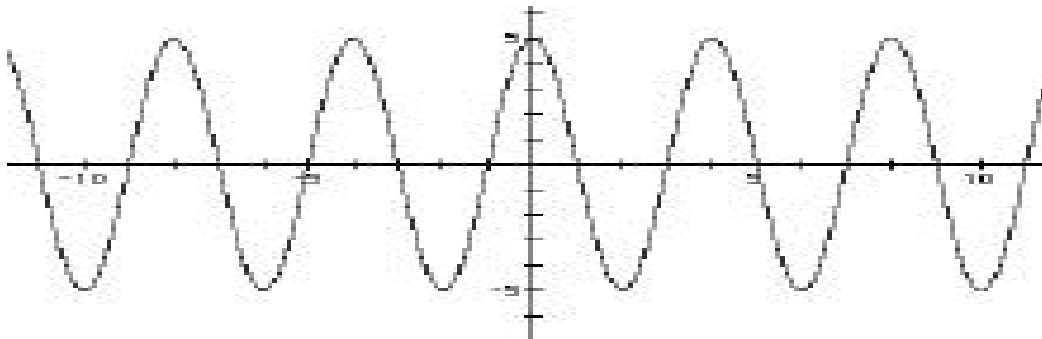
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Find all value of  $t$  between  $-2$  and  $2$  that satisfy the equation  $\sin(t) = -1/3$ .

Find all value of  $t$  between  $-2$  and  $2$  that satisfy the equation  $\cos(t) = 1/4$ .

Find the amplitude, period and phase shift of the function  $f(x) = 3\sin(2x - \pi)$  and graph the function for  $0 \leq x \leq 2\pi$ . Label the each axis with appropriate values.

Find the amplitude and period and write an equation for the graph.



At a certain port the height of a tide at any time during the day is  $h(t) = 6.4\sin(\pi t/6)$ . Here,  $h$  is the height in feet above or below a central line and  $t$  is the hour of the day with  $t = 0$  corresponding to midnight. Graph  $h(t)$  over three periods beginning at  $t = 0$ . Over this time frame when does high tide occur?

You are in a kayak several hundred yards off shore and the waves are lifting and dropping you so that you can see the shore only when you are at your highest position. You start timing the waves the next time that you see the shore and find that it takes four second to drop to your lowest position. If the difference between your lowest and highest position is 16 feet, write an equation for the difference in your lowest position and your current position at any given time  $t$ .

Write the following angle measurements in radians as exact values.

20 degrees                  120 degrees                  -800 degrees

Write the following angle measurements in radians rounded to five decimal places.

210.63 degrees                  -63.27 degrees

Write the following angle measurements in degrees as exact values.

12 radians                  180 radians                  -25 radians

Write the following angle measurements in degrees using five decimal places.

8.19 radians                   $-\frac{13}{7}$  radians

Find the degree measure of  $50.478^\circ$  in degrees, minutes and seconds.

Find the degree measure of  $15^\circ 25' 16''$  to five decimal places.

Find the degree measure of  $4.752^r$  in degrees, minutes and seconds.

Find the degree measure of  $8.364^r$  to five decimal places.

Find the degree measure of an angle between 0 and 360 degrees which is coterminal with an angle of  $1234^\circ$ .

Find the radian measure of an angle between 0 and  $2\pi$  radians which is coterminal with an angle of  $20^r$ .

For a circle of radius 10, what is the length to the nearest tenth of an arc cut by a central angle of  $168^\circ$ ?

For a circle of radius 25, what is the area to the nearest tenth of a sector cut by a central angle of  $15\pi/12$  radians?

The diameter of the earth is about 8000 miles. If two islands on the equator are located at  $40^\circ$  west longitude and  $85^\circ$  west longitude, how far is it between these islands?

A tire for a compact car is 22 inches in diameter. If the car is traveling at a speed of 60 mph, find the angular speed of the tire in rpm's. Recall that there are 5280 feet in one mile.

A 6 foot long pendulum swings through an arc of  $25^\circ$ . How long is the arc made by the end of the pendulum?

Calculate the central angle, in degrees, of a circle with a 5 foot radius if the circle subtends an arc of 3 feet?

If a  $100^\circ$  central angle of a circle subtends an arc of length 30 feet on the circumference of the circle, what is the radius of the circle?

The area of a sector of a circle is  $14\text{ in}^2$  and its central angle is  $20^\circ$ . Find the radius of the circle.

The area of a sector of a circular flower bed is  $100\text{ ft}^2$  and the radius of the bed is 12 feet. What is the central angle of the sector in degrees?

Find the exact values of the trigonometric functions of an angle in standard position whose terminal side passes through the point  $(11, -5)$ .

For an angle  $\theta$  in standard position, which quadrant contains the terminal side if  $\tan(\theta) < 0$  and  $\csc(\theta) < 0$ .

Find the exact values of the trigonometric functions of an angle  $\theta$  in standard position if  $\cot(\theta) = 3$  in the first quadrant.

A 5 ft. tall snow man casts a shadow 8 ft. long. Find both of the angles in radians and in degrees that the rays of the sun make with the snowman and the ground.



For angle  $\theta = 1560^\circ$ , find the exact values of

$$\sin(\theta) = \underline{\hspace{2cm}}$$

$$\cos(\theta) = \underline{\hspace{2cm}}$$

For angle  $\theta = -765^\circ$ , find the exact values of

$$\sin(\theta) = \underline{\hspace{2cm}}$$

$$\cos(\theta) = \underline{\hspace{2cm}}$$

For angle  $\theta = 1320^\circ$ , find the exact values of

$$\sin(\theta) = \underline{\hspace{2cm}}$$

$$\cos(\theta) = \underline{\hspace{2cm}}$$

For angle  $\theta = -25\pi/3$  radians, find the exact values of

$$\sin(\theta) = \underline{\hspace{2cm}}$$

$$\cos(\theta) = \underline{\hspace{2cm}}$$

For angle  $\theta = 33\pi/6$  radians, find the exact values of

$$\sin(\theta) = \underline{\hspace{2cm}}$$

$$\cos(\theta) = \underline{\hspace{2cm}}$$

Suppose that an angle in standard position has a terminal side which goes through the point  $(4/5, 3/5)$ . Find the values of the trigonometric functions for this angle.

Suppose that an angle of  $t$  radians is in standard position and the terminal side goes through the point  $(-8/17, 15/17)$ . What point on the unit circle would the angle go through if  $t$  is changed to  $t + \pi$ ?      to  $t - \pi$ ?      to  $-t$ ?      to  $-t - \pi$ ?

Let  $P$  be the point on the unit circle  $U$  that corresponds to  $t$ . Find the exact coordinates of  $P$  when  $t = 7\pi/4$ .      when  $t = -3\pi/4$ .

Find the the quadrant containing the point **P** on the unit circle **U** for the given conditions.

(a)  $\tan(t) < 0$  and  $\cos(t) > 0$

(b)  $\sec(t) > 0$  and  $\tan(t) < 0$

(c)  $\csc(t) > 0$  and  $\cot(t) < 0$

(d)  $\cos(t) < 0$  and  $\csc(t) < 0$

Find the exact values of the reference angles for the following angles.

$275^\circ$

$400^\circ$

$2/3$

$-23/6$

Find the exact values of the following trig functions.

$\sin(-315^\circ) =$

$\cos(-11/6) =$

$\tan(-225^\circ) =$

Find all angles between  $0^\circ$  and  $360^\circ$  ( $0^r$  and  $2^r$ ) with following properties.

$\cos(\quad) = .5$

$\sin(\quad) = .5$

$\tan(\quad) = 1$

Give the amplitude and the period of each function.

$4.5\sin(3x)$

$-23\sin(5x)$

$\sin(-x/4)/6$

$(1/5)\cos(x/3)$

$-1.8 \cos(-x/6)$

Write functions with the given amplitude and period.

Sine function with Amplitude =  $1/2$  , Period = 6

Sine function with Amplitude = 12 , Period = 6

Sine function with Amplitude = 2 , Period =  $(1/6)$

Cosine function with Amplitude = 2.6 , Period = 16

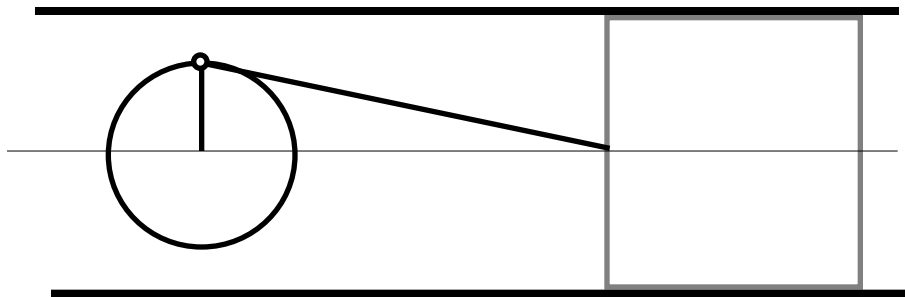
Cosine function with Amplitude = 112 , Period = 9.5

For each of the following functions, give exact values for the amplitude, period, phase shift, and mean value.

$$3.2 - 4.1\sin(2x + 6) \quad 1/3 + \cos(x - 1/2)/5$$

$$(\sqrt{3})\sin(x/4 - 3/2) - 1 \quad 6\cos(3x/4 + 1) + 8 \quad \sin(3.1x - 6.2)$$

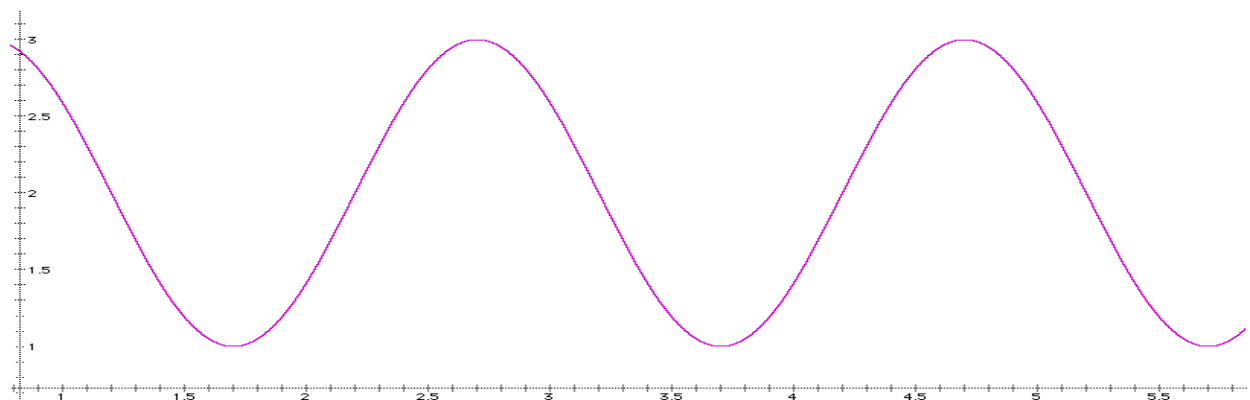
A piston, which is 6 feet in diameter, is connected to the rim of a wheel with radius 2 feet. The piston and the wheel are inside the same cylinder. The length of the connecting rod is 5 feet. The piston is driving the rotation of the wheel at 120 rpm. Find a formula for the vertical distance, at any give second after the piston begin moving, from the bottom of the cylinder to the point where the connecting rod is attached to the wheel. The movement begins at the position indicated by the diagram.



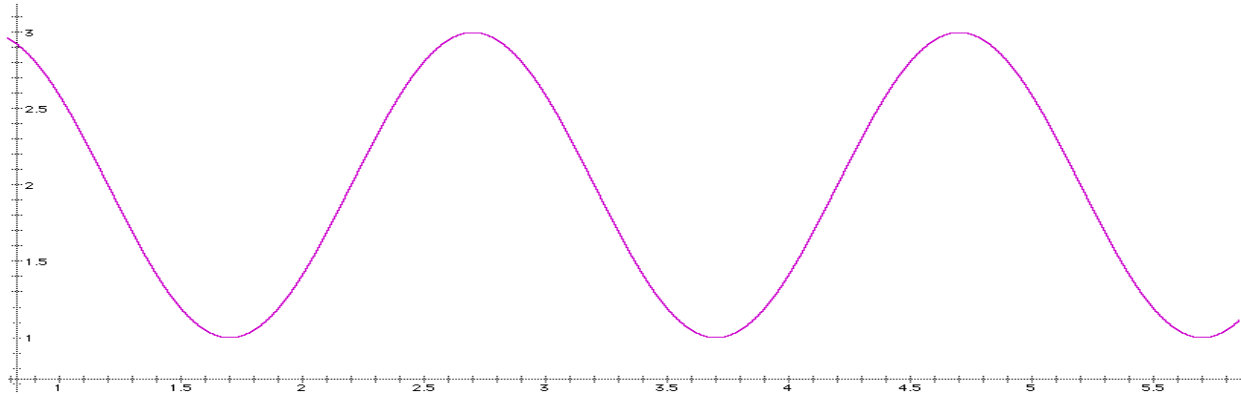
As you ride a ferris wheel, your distance from the ground varies with time. Suppose that there are 18 seats and when the last seat is filled and the ferris wheel ride begins, your seat is three seats ahead of the last seat to be filled. It takes you 4 seconds to reach the top, which is 50 feet above the ground. The wheel has a diameter of 44 feet. Find an equation that represents your height off the ground at any give time during the ride.

Find the mean value, the amplitude, the period and the phase shift. Also draw and label both axes.

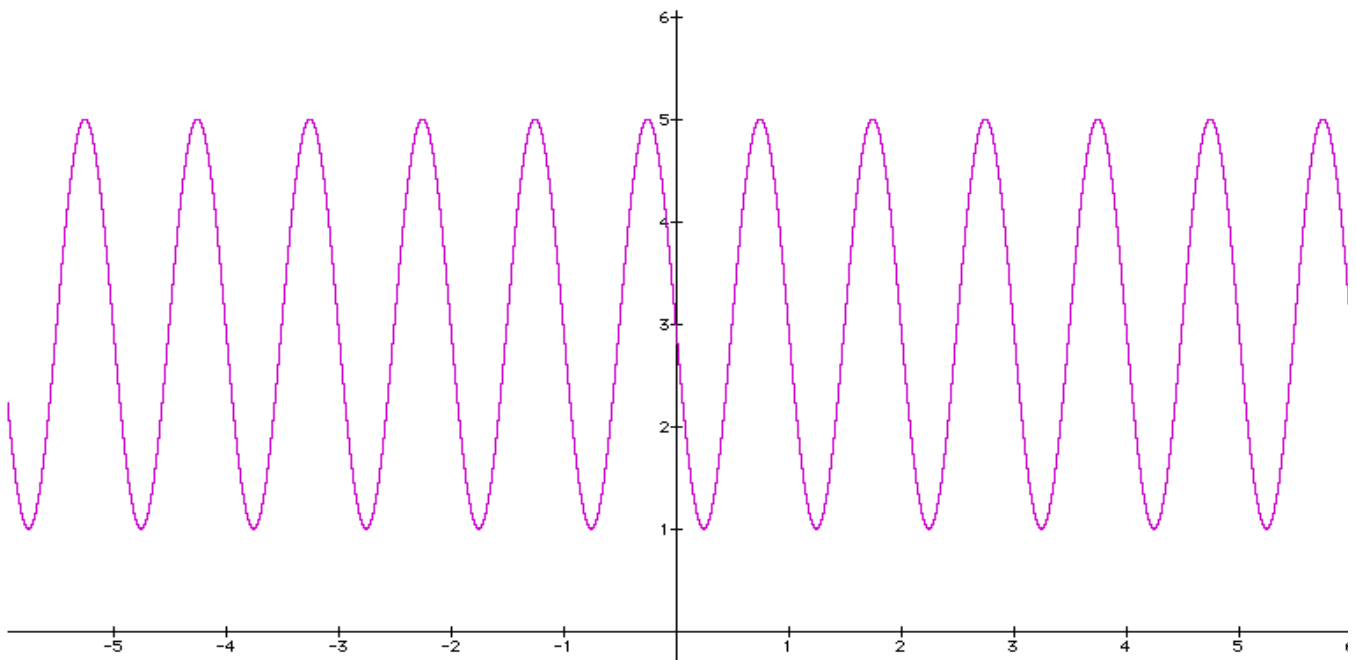
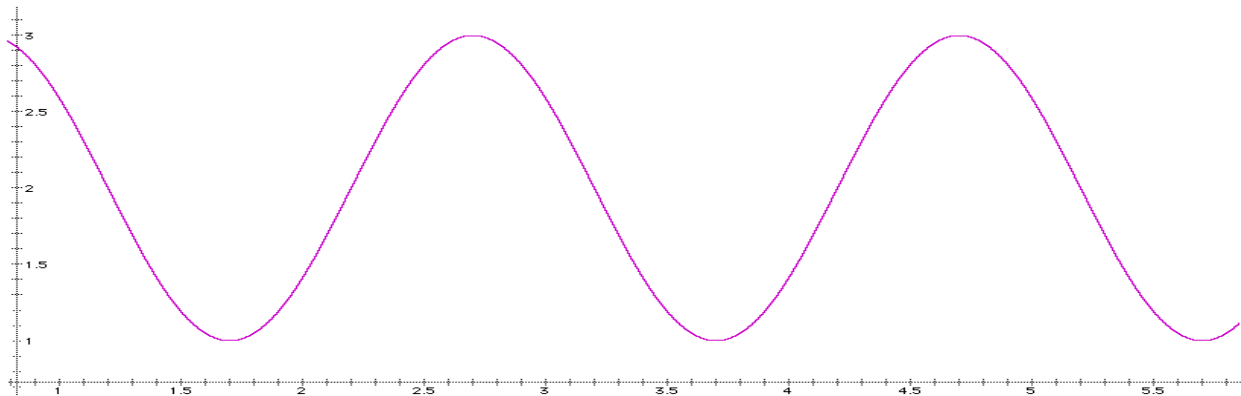
$$y = \cos(2x - \pi) + 2$$



Find the mean value, the amplitude, the period and the phase shift. Also draw and label both axes.  $y = 4\sin(x/3 - \pi/3)$



Find the mean value, the amplitude, the period and the phase shift. Also draw and label both axes.  $y = -4\sin(3x - \pi) - 3$



Write the equation for the sine graph above.