

A. Which of the following equations would produce the graph shown below? Choose all that apply.

$y = \cos x$

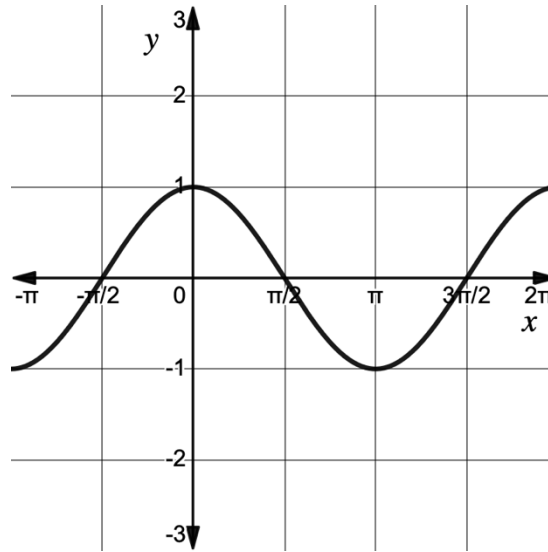
$y = -\cos x$

$y = \sin\left(x + \frac{\pi}{2}\right)$

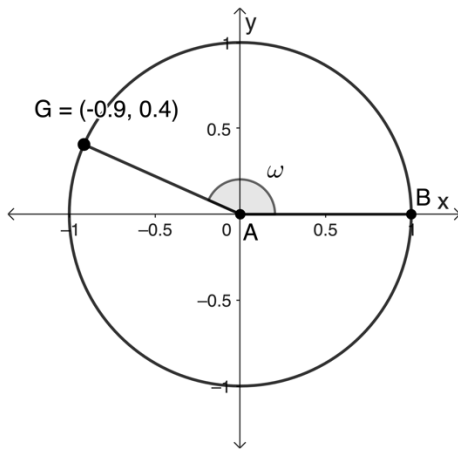
$y = \cos(-x)$

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

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



B. Find  $\tan \omega$ .



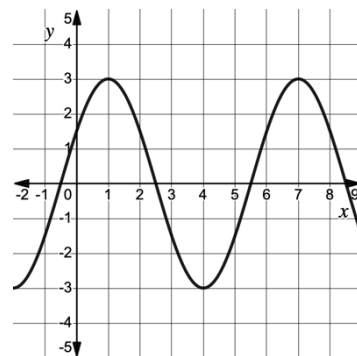
C. Write the equation of a sinusoidal function with a range of  $[-1, 7]$ .

D. An angle in standard position has a measure of 4 radians. The terminal ray of the angle intersects a circle centered at the origin with a radius of 1, at point A.

a. In what quadrant is Point A?

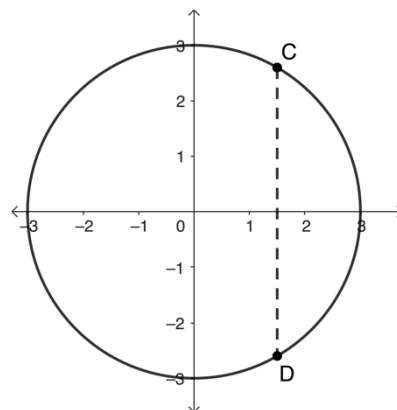
b. Give the coordinates of Point A, to the nearest thousandth.

- E. A portion of the graph of a periodic function  $y = f(x)$  is shown. On each of the following intervals, determine if  $f$  is increasing or decreasing and if the graph of  $f$  is concave up or concave down.



Interval	Increasing or Decreasing?	Concave up or Concave down?
$22 < x < 23.5$		
$13 < x < 14.5$		
$38.5 < x < 40$		

- F. In the diagram shown, the angle in standard position whose terminal ray passes through  $C$  has a measure of  $\frac{\pi}{3}$ . The angle in standard position whose terminal ray passes through  $D$  has a measure of  $\frac{5\pi}{3}$ . Find the length of segment  $CD$ .



- G. Evaluate without a calculator.

$$\cos\left(\frac{2\pi}{3}\right)$$

$$\tan\left(\frac{5\pi}{4}\right)$$

$$\sin\left(\frac{15\pi}{2}\right)$$

$$\sin\left(\frac{11\pi}{6}\right)$$

$$\cos\left(\frac{7\pi}{6}\right)$$

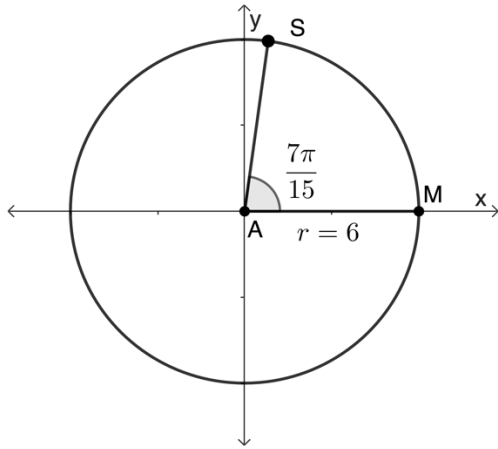
$$\cos\left(-\frac{\pi}{3}\right)$$

$$\sin\left(\frac{3\pi}{4}\right)$$

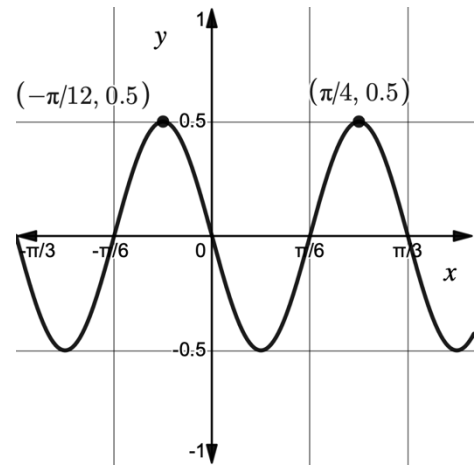
$$\tan 7\pi$$

$$\tan\left(\frac{4\pi}{3}\right)$$

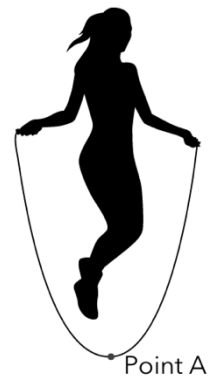
H. What is the length of the minor arc of the circle from point M to Point S?



I. The equation for the graph shown is given by  $y = g \sin h \left( x - \frac{\pi}{2} \right)$ . Find the values of  $g$  and  $h$ .



J. Jessie jumps rope. Point A is a point in the center of the jump rope. The maximum height of Point A occurs when the jump rope is directly above Jessie's head, at a height of 7.5 feet. The jump rope starts on the ground. In 1 minute, Jessie completes 80 jumps. The function  $j$  can be used to model the height of Point A, in feet, as a function of the time, in seconds,  $t$ .



- Identify the maximum value of  $j$ .
- Identify the period of  $j$ . Indicate units.
- Identify the midline of the graph of  $j$ .
- Write an equation for  $j(t)$ .