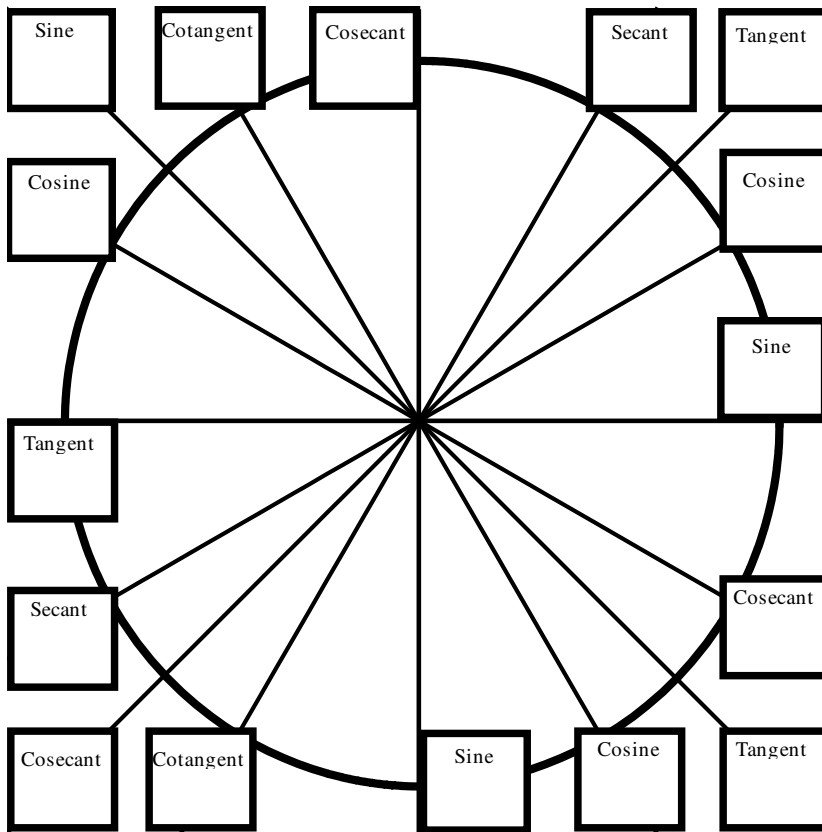
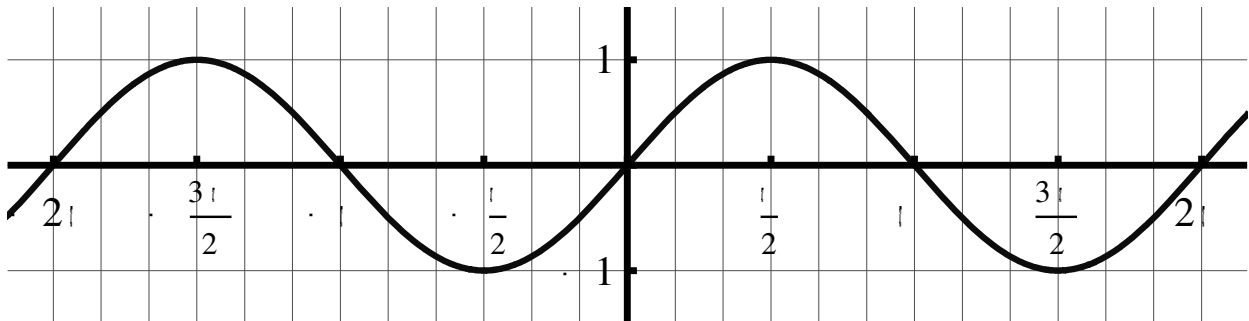


Be sure to *show your work* wherever possible.



1. The unit circle at left has been divided into equal eighths and twelfths.
 - a) Place the appropriate value in each of the boxes, based on the trig ratio given. Leave answers in *exact form* (no decimals).
 - b) Which of the trig functions gives the slope of the terminal ray at any angle?
 - c) What is the slope of the line tangent to the top semicircle at the point $(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$?
 - d) What is the slope of the line tangent to the bottom semicircle at the point $(\frac{\sqrt{3}}{2}, -\frac{1}{2})$?
 - e) What calculus name is given to the values for parts (c) and (d)?

2. A sine curve is graphed below.



- a) From the graph, estimate the derivatives of the sine curve at the following x -values. They should be nice numbers.

i) -2π	ii) $-\frac{3\pi}{2}$	iii) $-\pi$	iv) $-\frac{\pi}{2}$	v) 0	vi) $\frac{\pi}{2}$	vii) π	viii) $\frac{3\pi}{2}$	ix) 2π
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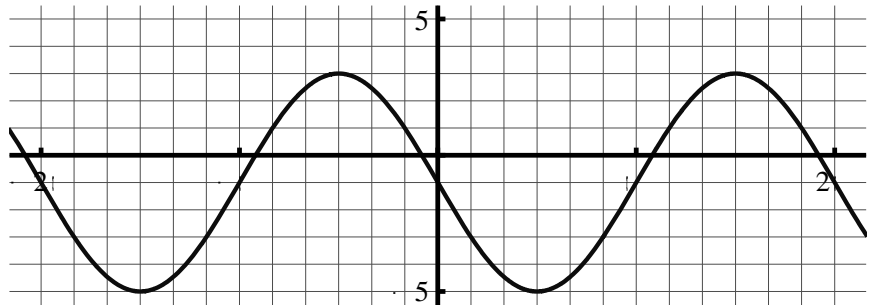
- b) On the same axes, plot each one of the derivatives above at the x -values given. Draw a nice sinusoidal function that hits every one of your new points. This derivative function seems to be a nice companion for the sine function. What would be a good name for this function?

3. Recall that the graph of a sinusoid can be written as $y = A\cos[B(x - h)] + k$, where:

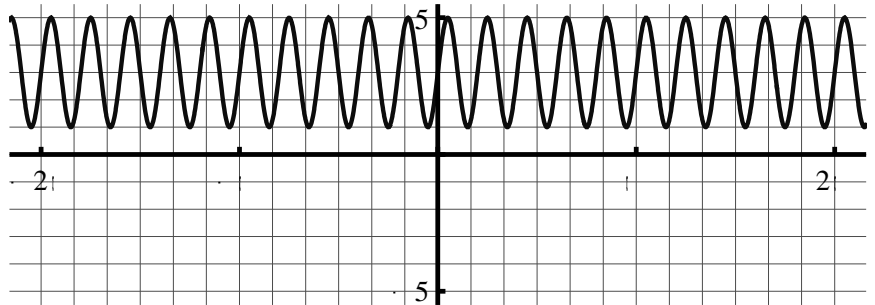
- the sinusoidal axis is the line $y = k$
- the phase displacement is h
- The amplitude is $|A|$
- The period is $\frac{2\pi}{|B|}$

Write an appropriate function to match each graph below. Feel free to verify these on your calculator, but check the window. Angle measures should be in radian mode.

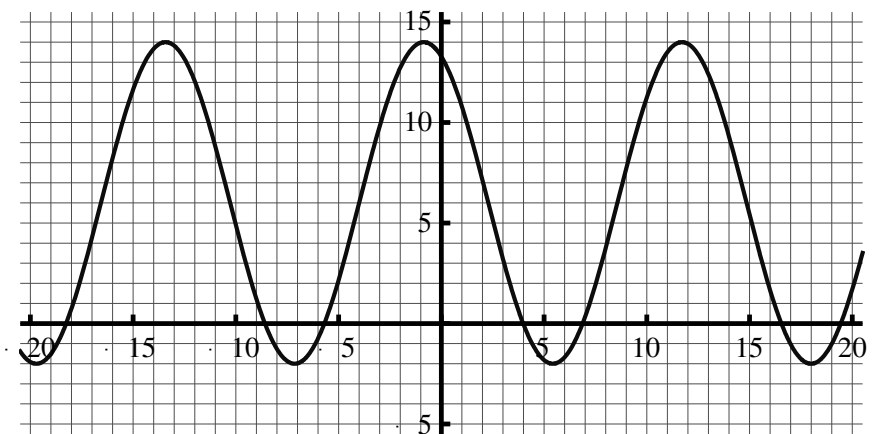
a)



b)



c)



d)

