

Group: _____ Present: _____

1. Predict the graph of
- $y = \frac{1}{2} \cos(3x) - 1$
- :

Period = _____

Vertical stretch = _____

Vertical shift = _____

Find a good viewing window for this graph:

[_____, _____] $\times$ [_____, _____]

2. Find
- all*
- solutions to the equation
- $\csc(x) = 2$
- :

1. Algebraically (get exact solutions):

 $x =$ _____

2. Graphically (get approximate solutions):

 $x \approx$ _____

3. In this exercise you investigate functions of the form
- $f(x) = a \sin(bx) + d \cos(cx)$
- for various values of
- a, b, c
- and
- d
- .

Decide by graphing which of the following functions are sinusoids. For those that are sinusoids, *estimate* the amplitude, phase shift and period (use the max/min and root/zero features under the CALC menu).

 $y = \sin(x) + \cos(x)$ Sinusoid: Yes Amplitude = _____Phase shift = _____ Period = 2π $y = 3 \sin(x) - 2 \cos(x)$ Sinusoid: _____ Amplitude = 3.6

Phase shift = _____ Period = _____

 $y = 3 \sin(x) - 2 \cos(2x)$ Sinusoid: _____ Amplitude = _____

Phase shift = _____ Period = _____

 $y = 3 \sin(2x) - 2 \cos(2x)$ Sinusoid: _____ Amplitude = _____

Phase shift = _____ Period = _____

 $y = 3 \sin(2x - \pi) - 2 \cos(2x)$ Sinusoid: _____ Amplitude = _____

Phase shift = _____ Period = _____

$$y = 5 \sin(2x + \frac{\pi}{2}) + 2 \cos(3x - \pi) \quad \text{Sinusoid: } \underline{\hspace{2cm}} \quad \text{Amplitude} = \underline{\hspace{2cm}}$$

$$\text{Phase shift} = \underline{\hspace{2cm}} \quad \text{Period} = \underline{\hspace{2cm}}$$

$$(*) \quad y = 5 \sin(3x + \frac{\pi}{2}) + 2 \cos(3x - \pi) \quad \text{Sinusoid: } \underline{\hspace{2cm}} \quad \text{Amplitude} = \underline{\hspace{2cm}}$$

$$\text{Phase shift} = \underline{\hspace{2cm}} \quad \text{Period} = \underline{\hspace{2cm}}$$

$$y = 3 \cos(3x - 2) + 2 \sin(2x + 4) \quad \text{Sinusoid: } \underline{\hspace{2cm}} \quad \text{Amplitude} = \underline{\hspace{2cm}}$$

$$\text{Phase shift} = \underline{\hspace{2cm}} \quad \text{Period} = \underline{\hspace{2cm}}$$

Using data from line (*) above, write a single sinusoid $y = A \sin(bx + \alpha)$ for this function.

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

4. Sums of various sine and cosine functions can be used to approximate some interesting periodic functions. Graph the following in the viewing window $[0, 4\pi] \times [-0.5, 3.5]$:

$$y = \frac{\pi}{2} - \frac{4}{\pi} \cos(x) - \frac{4}{9\pi} \cos(3x)$$

$$y = \frac{1}{2} + \frac{2}{\pi} \sin(x) + \frac{2}{3\pi} \sin(3x) + \frac{2}{5\pi} \sin(5x) + \frac{2}{7\pi} \sin(7x)$$