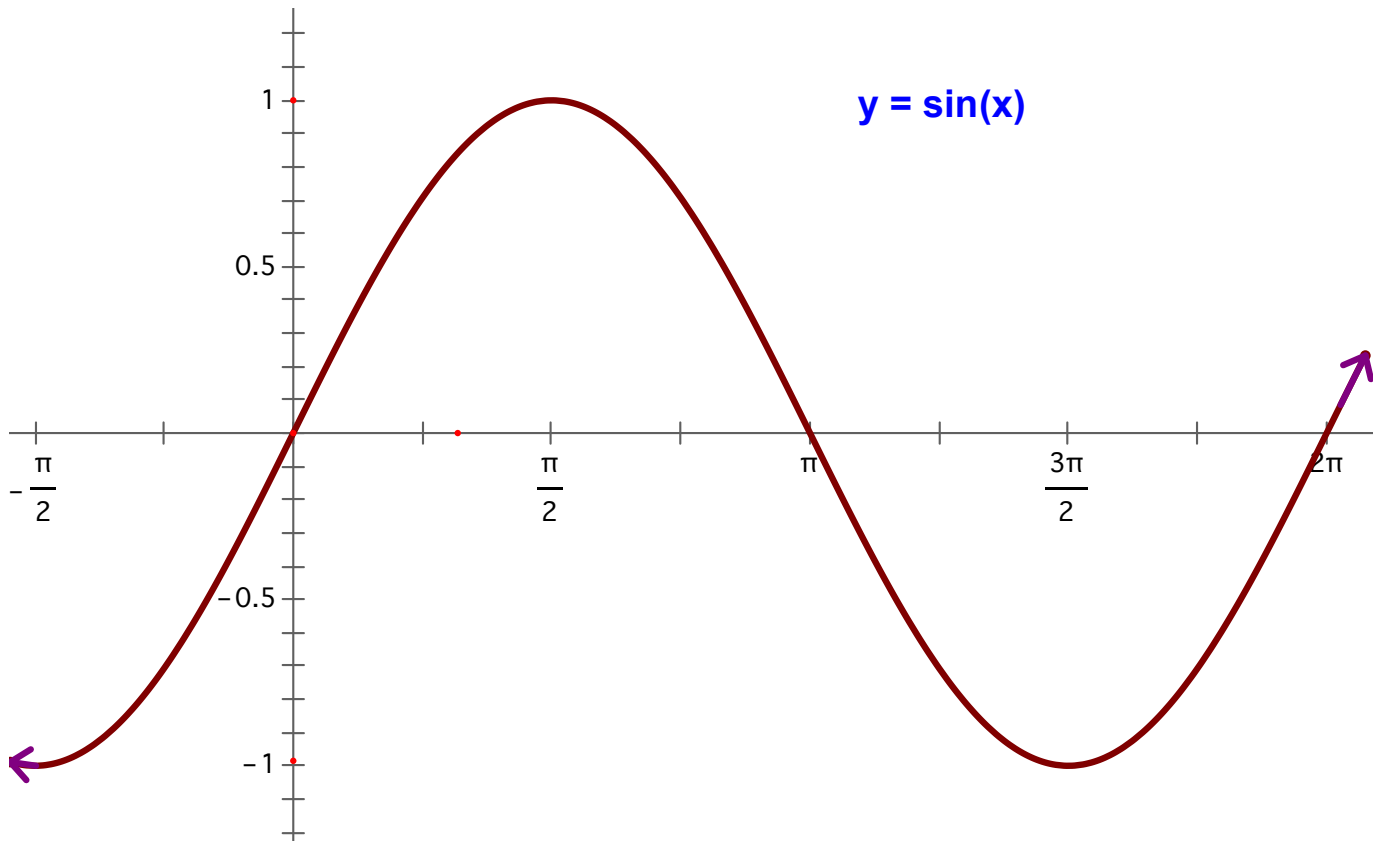


Sections 4.5 – Graphs of Sine & Cosine Functions

Sine Curve

****The graph of the sine function****

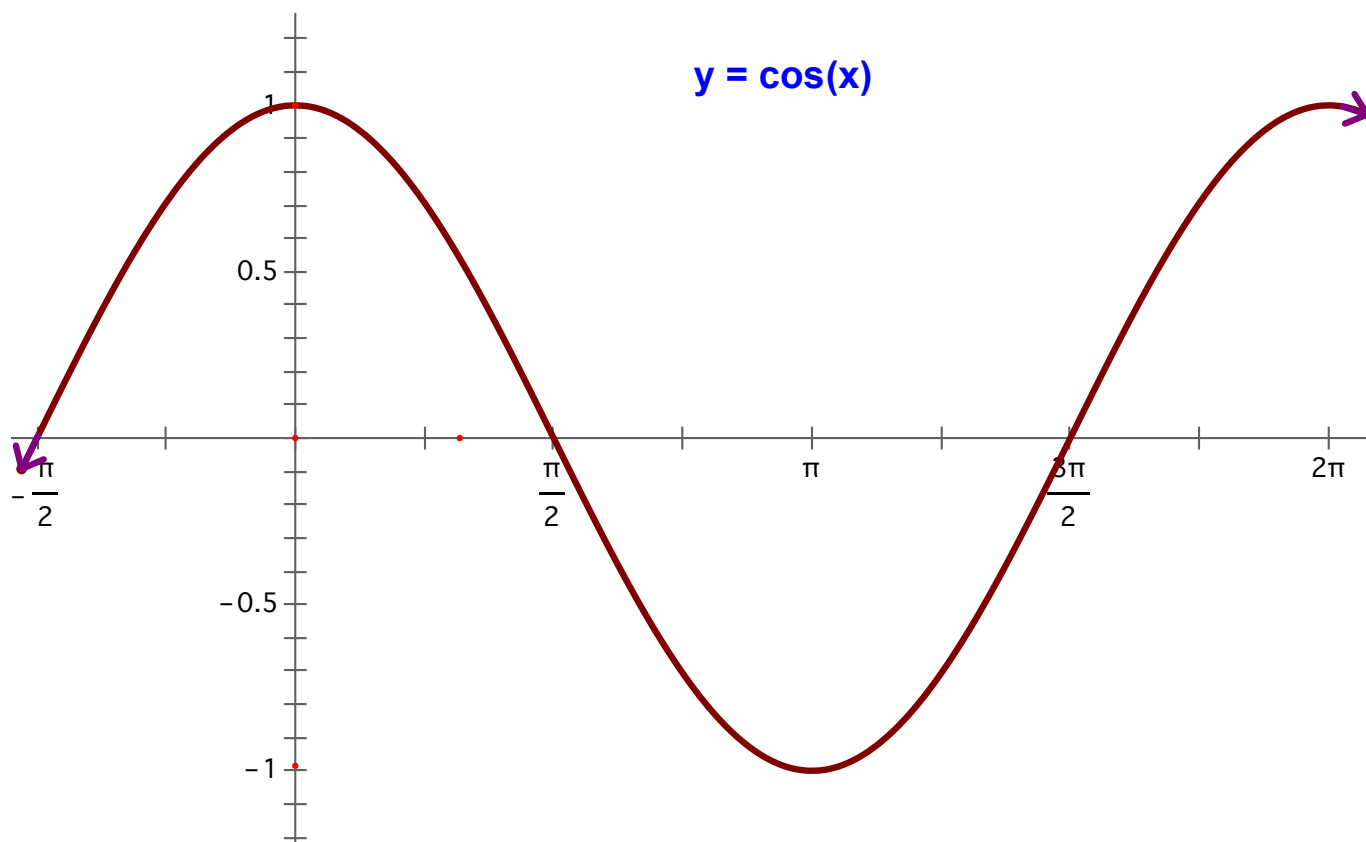


- Domain:
- Range:
- Symmetric with respect to the *origin* so this is an **ODD** function.
- Period:
- Zeros:
- Max:
- Min:

Sections 4.5 – Graphs of Sine & Cosine Functions

Cosine Curve

****The graph of the cosine function****



- Domain:
- Range:
- Symmetric with respect to the **y-axis** so an **EVEN** function
- Period:
- Zeros:
- Max:
- Min:

Sections 4.5 – Graphs of Sine & Cosine Functions

Important Vocab

Amplitude – *half the distance between the minimum and maximum value of a function over a given range.*

Period – *the distance required to complete one full cycle (one complete repetition of a pattern)*

Frequency – *the number of cycles completed in a given interval* $\left(\text{frequency} = \frac{1}{\text{period}}\right)$

Summary of Translations of Sine and Cosine

$$Y = A \sin B(x - C) + D$$

$$A = \underline{\hspace{2cm}}$$

$$B = \underline{\hspace{2cm}} \text{ which gives us a period of } \underline{\hspace{2cm}}$$

$$C = \underline{\hspace{2cm}}$$

$$D = \underline{\hspace{2cm}}$$

The general equations,

$$y = A \sin B(x - C) + D \quad \text{and} \quad y = A \cos B(x - C) + D$$

have the following characteristics:

$$\text{amplitude} = |A|$$

$$\text{period} = \frac{2\pi}{B}$$

1. If $C > 0$ there is a horizontal shift C units to the right
if $C < 0$ there is a horizontal shift C units to the left.
2. If $D > 0$ the shift is D units upward
if $D < 0$ the shift is D units downward.
3. If $A < 0 \rightarrow$ reflection across x -axis.
4. If $B < 0 \rightarrow$ reflection across y -axis.

Sections 4.5 – Graphs of Sine & Cosine Functions

Examples:

Describe the change (transformations) between the following graphs and their respective parent functions- consider amplitude, period and shifts:

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

amplitude: _____

period: _____

Reflection? _____

Shifts: _____

b) $y = \frac{1}{2}\sin(6x)$

amplitude: _____

period: _____

Reflection? _____

Shifts: _____

c) $f(x) = -3\sin(x + \pi)$

amplitude: _____

period: _____

Reflection? _____

Shifts: _____

d) $f(x) = \cos\frac{1}{4}x + 8$

amplitude: _____

period: _____

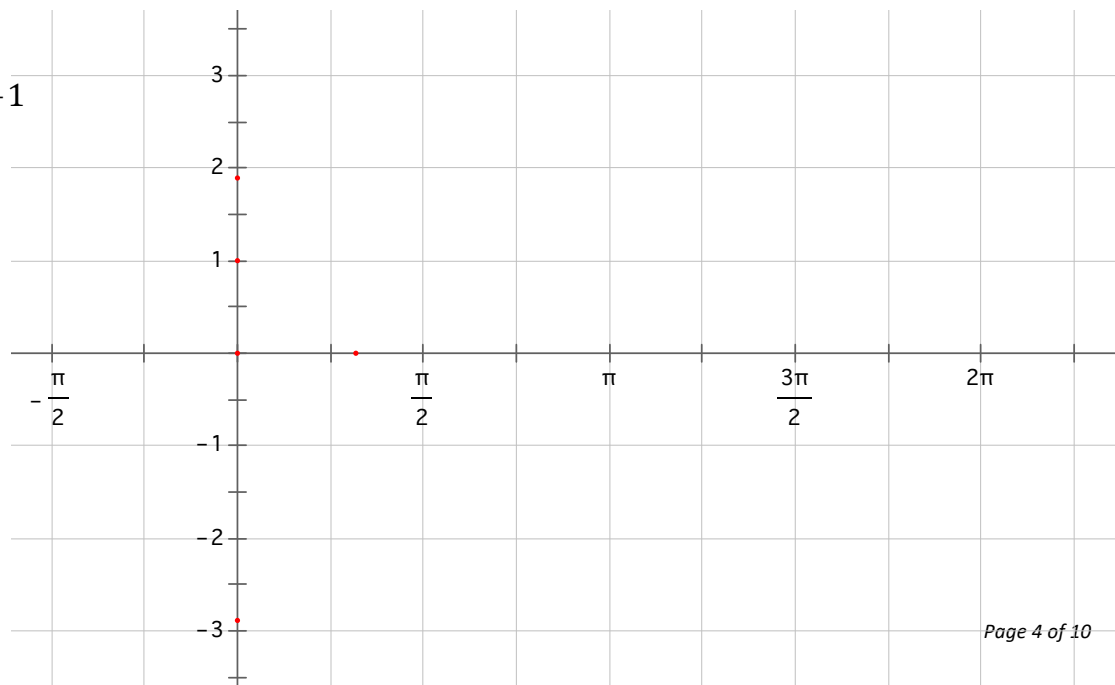
Reflection? _____

Shifts: _____

Graph the following functions:

a) $y = \cos x$

b) $y = 2\cos x + 1$



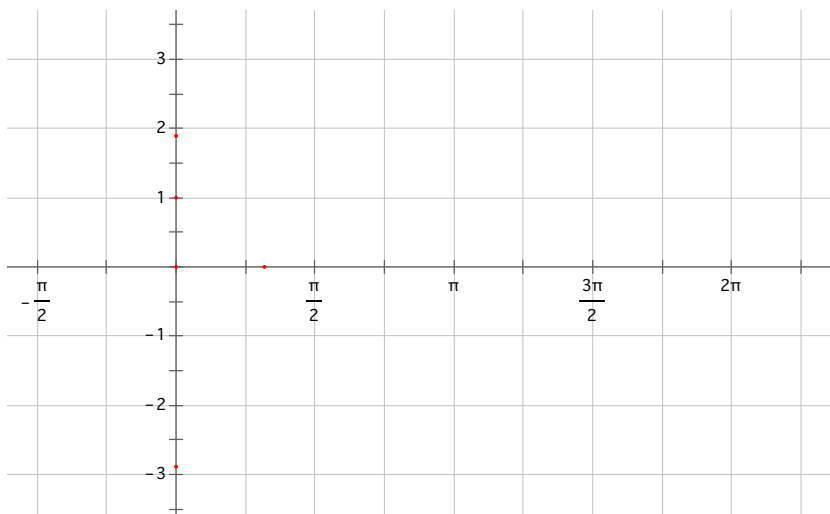
Sections 4.5 – Graphs of Sine & Cosine Functions

More Examples!

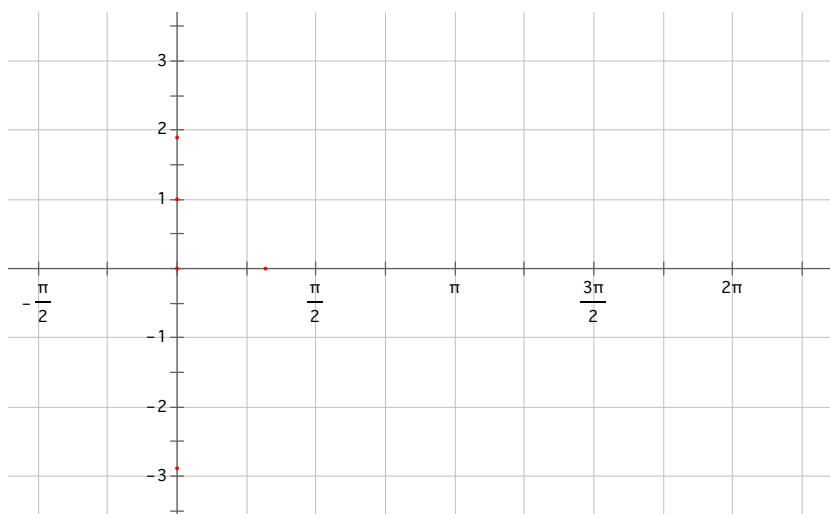
For the following graphs, graph on the same coordinate axes.

You should graph at least between 0 and 2π , unless you want to graph more...

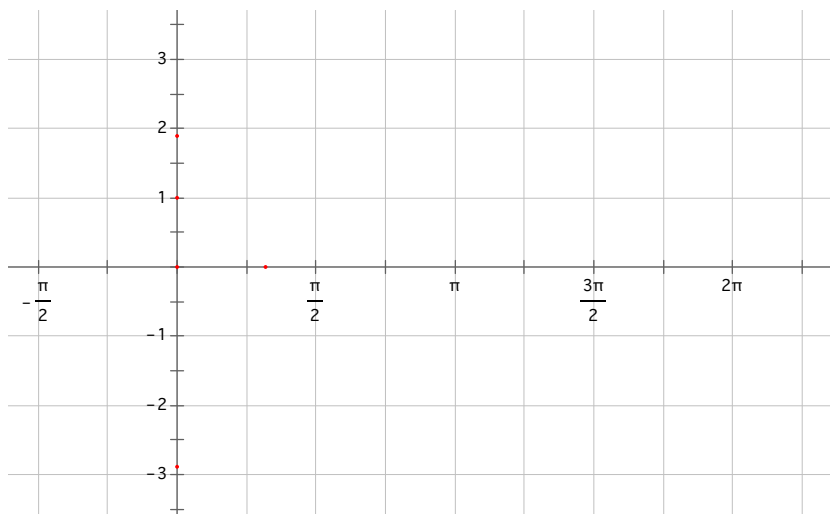
a) $y = \sin x$



b) $y = 2\sin x$



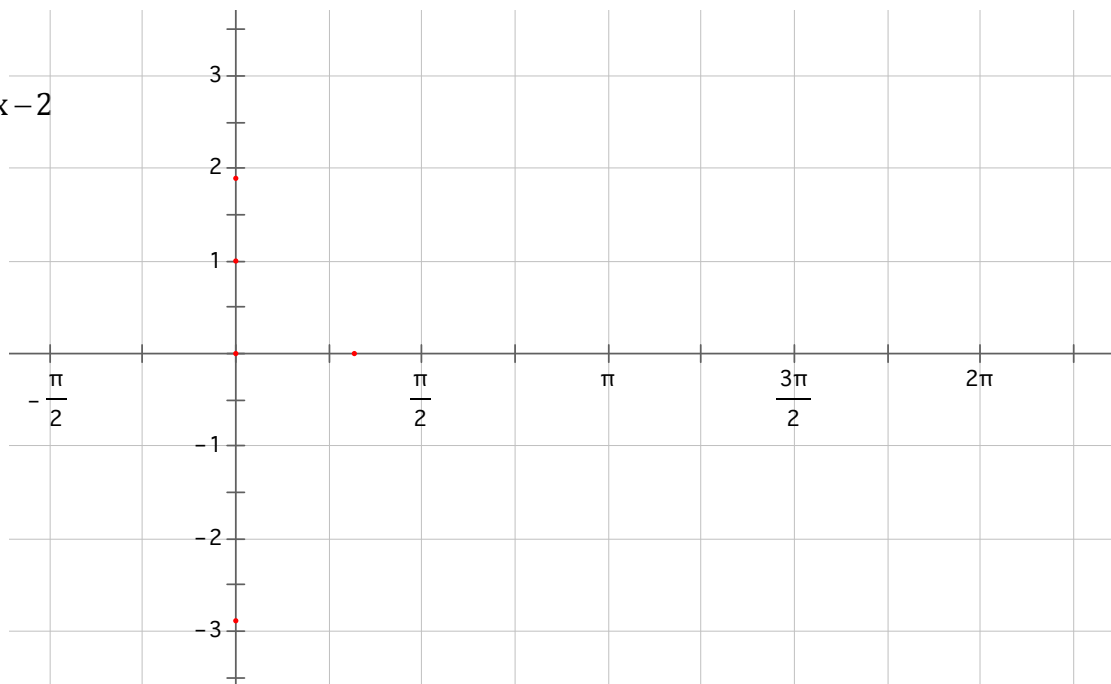
c) $y = \sin\left(\frac{1}{2}x\right)$



Sections 4.5 – Graphs of Sine & Cosine Functions

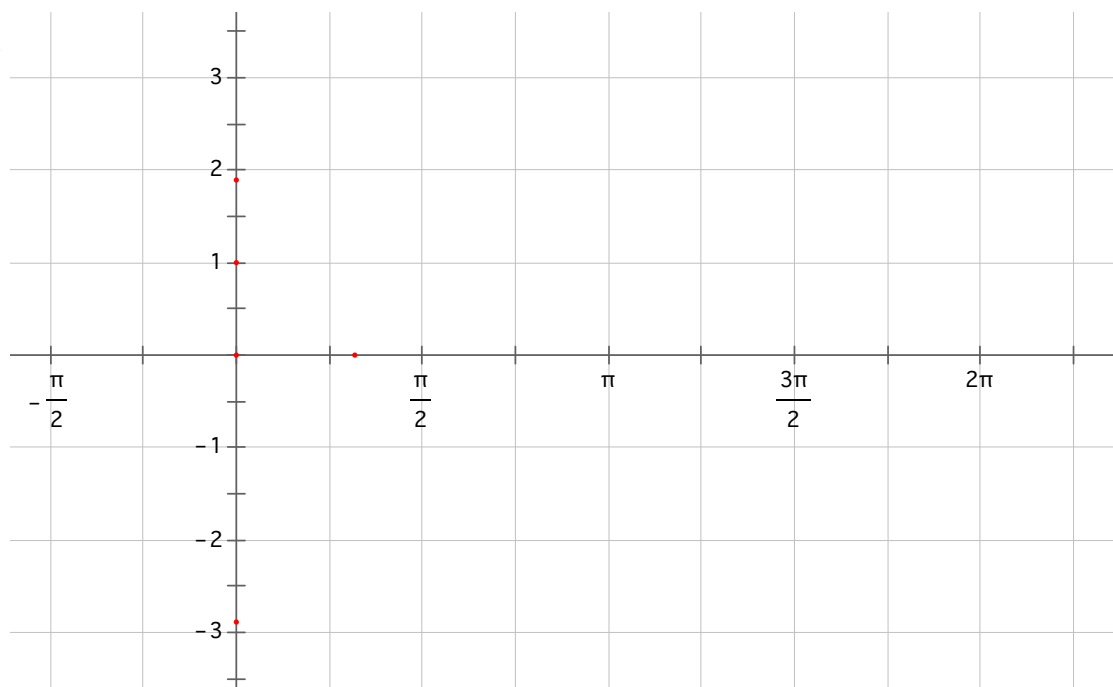
a) $y = \cos x$

b) $y = \frac{1}{2}\cos x - 2$



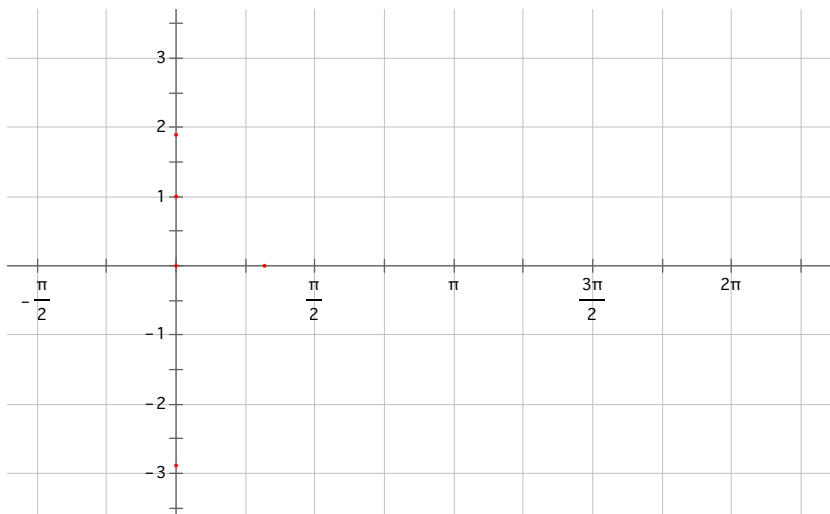
a) $y = \sin x$

b) $y = 2\sin 3x$

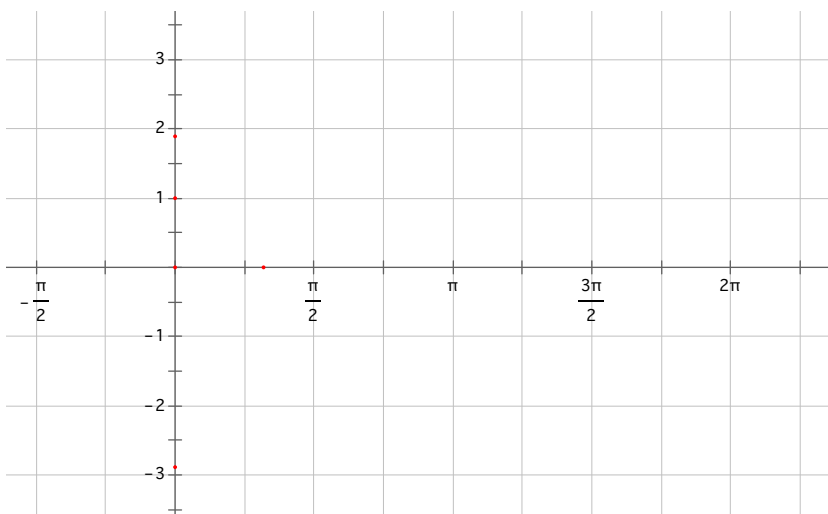


Sections 4.5 – Graphs of Sine & Cosine Functions

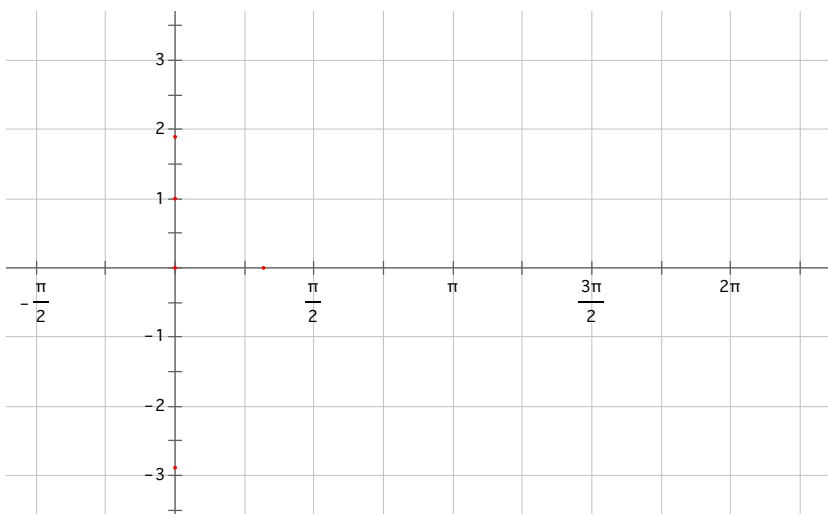
a) $y = \cos x$



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

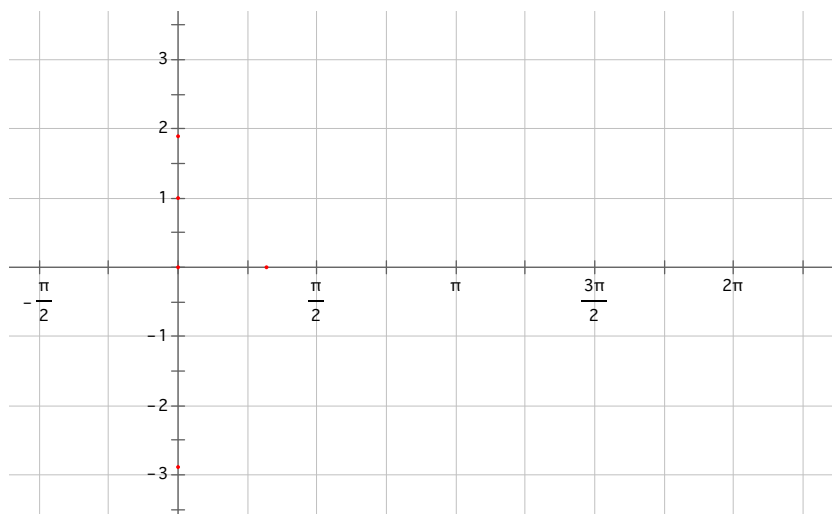


c) $y = -\frac{1}{4}\cos 2x - 3$

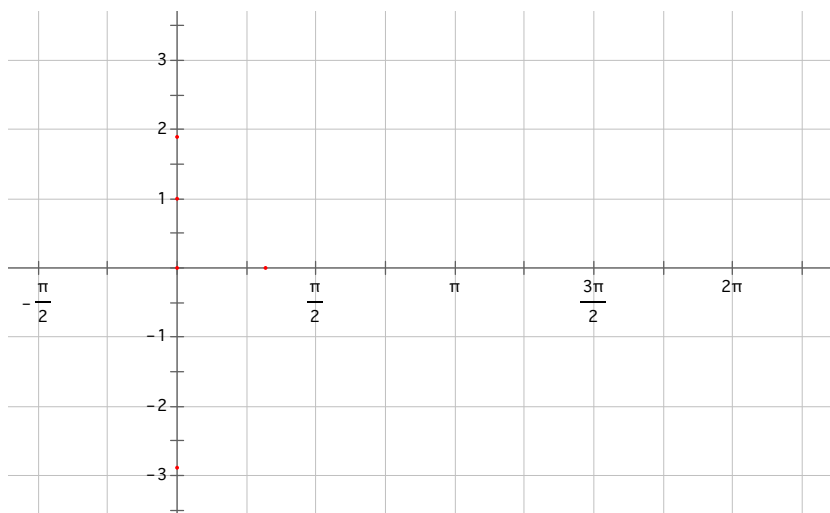


Sections 4.5 – Graphs of Sine & Cosine Functions

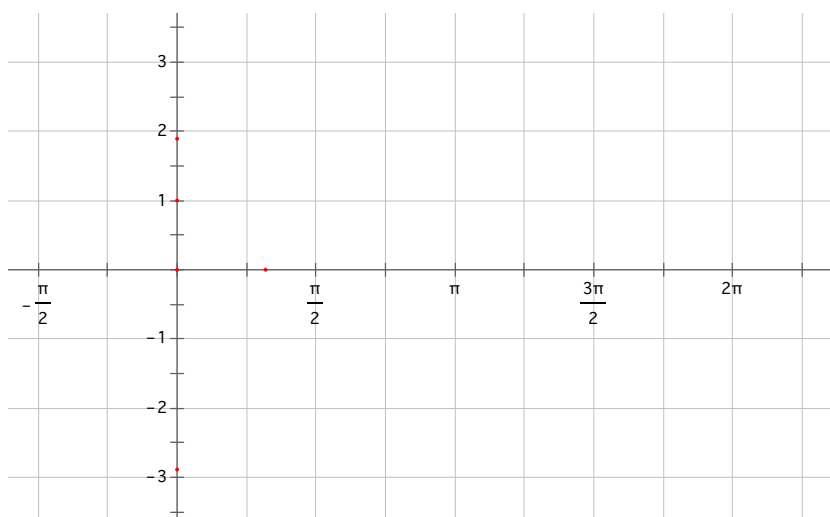
a) $y = \sin x$



b) $y = \sin(x - \pi)$



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



Sections 4.5 – Graphs of Sine & Cosine Functions

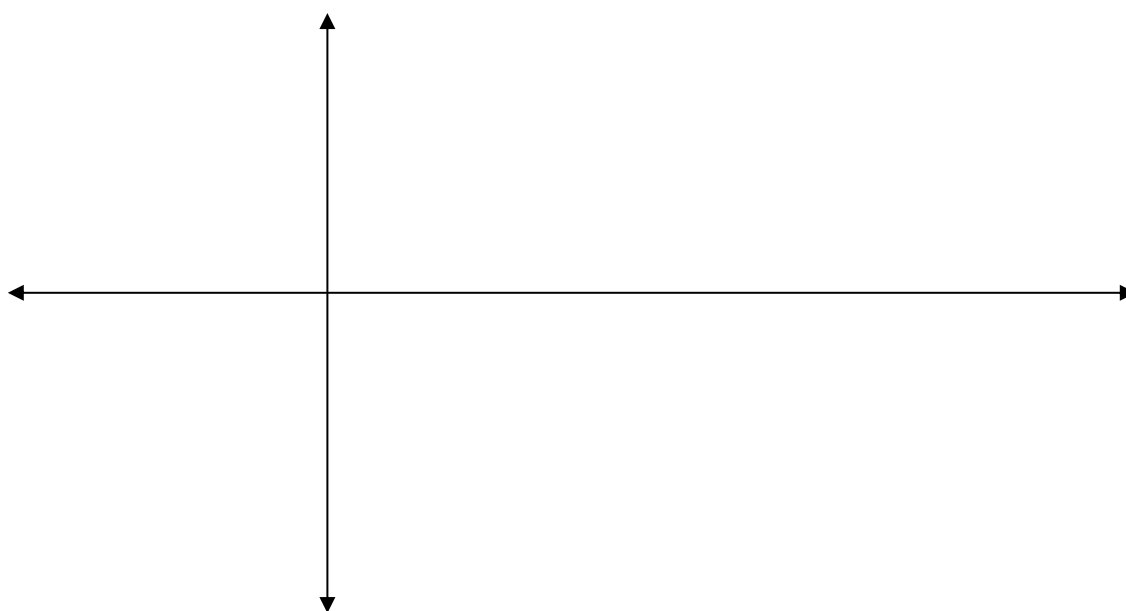
More Practice...

Sketch graphs of the following:

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

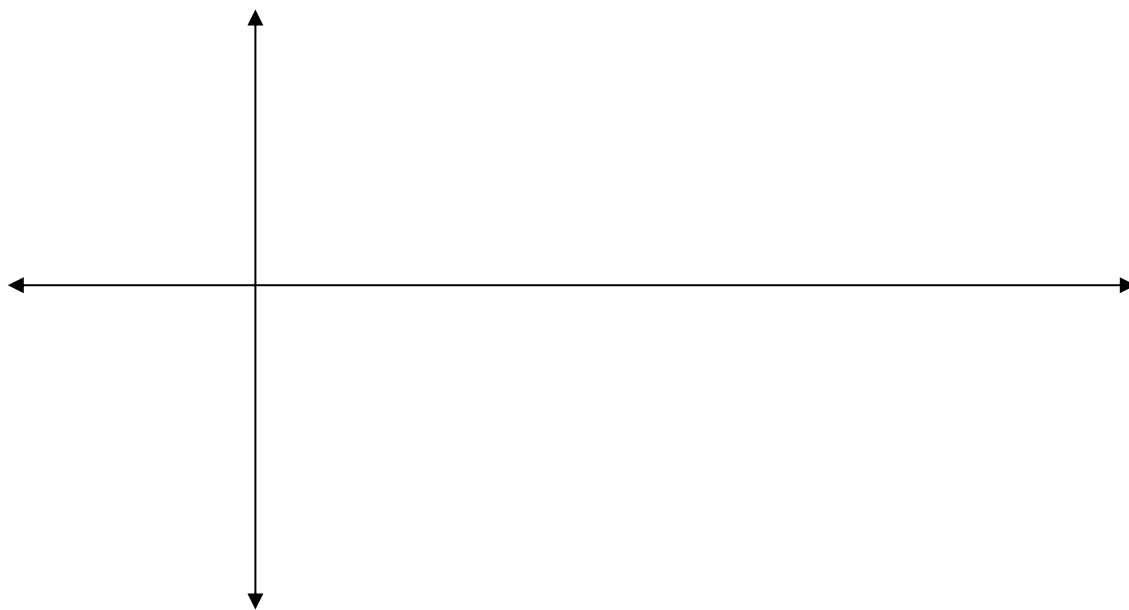


b) $y = -3 \cos(2\pi(x + 2))$ (so weird... since the "b" value has a pi, that means your x- axis will NOT have a pi)

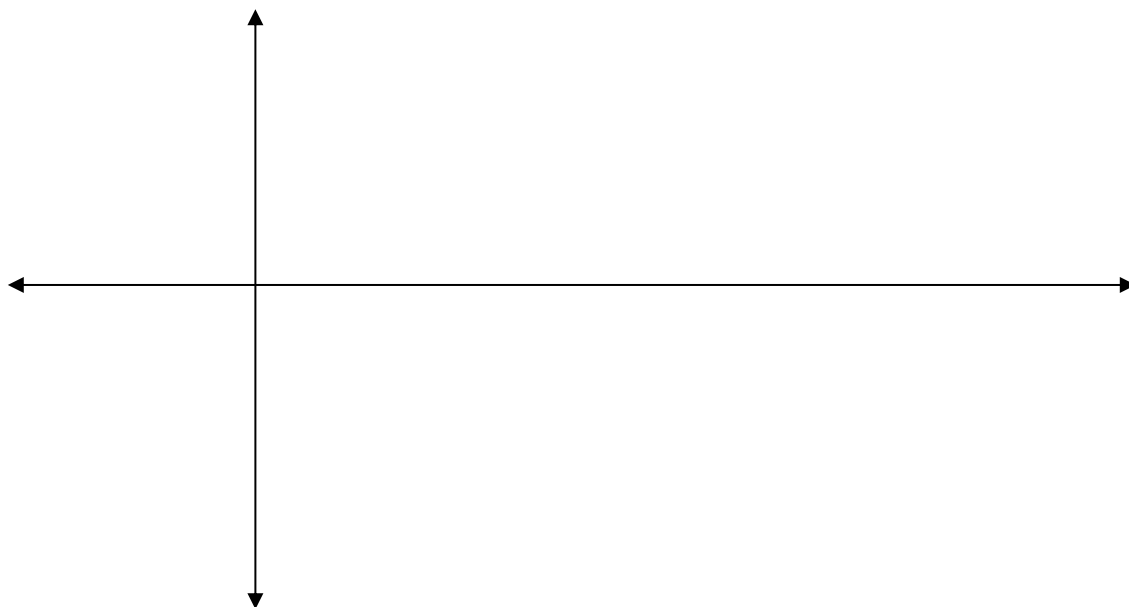


Sections 4.5 – Graphs of Sine & Cosine Functions

c) $y = 4 \cos 3x + 2$



d) $y = -\sin \frac{1}{2}(x - \pi) - 1$



Homework: Day 1 p.328 #3-54 multiples of three

Day 2 p. 328 #4, 7, 10, 13, 19, 25, 31, 37, 43, 49, 52

Day 3: Finish up any problems you skipped or had trouble with the first time