

### Homework 8-1

1. See graph

7. See graph

2a. 1    2b. -1

8a. 1    8b. -1

3.  $[-1, 1]$

9.  $[-1, 1]$

4.  $\{\pi/2\}$

10.  $\{0, 2\pi\}$

5.  $\{3\pi/2\}$

11.  $\{\pi\}$

6a.  $(0, \frac{\pi}{2})$  and  $(\frac{3\pi}{2}, 2\pi)$

12a.  $(\pi, 2\pi)$

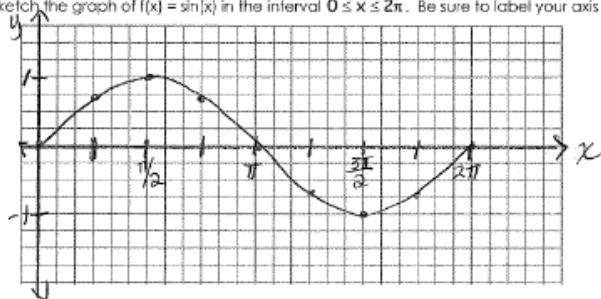
6b.  $(\frac{\pi}{2}, \frac{3\pi}{2})$

12b.  $(0, \pi)$

Name: Key  
 Period: \_\_\_\_\_

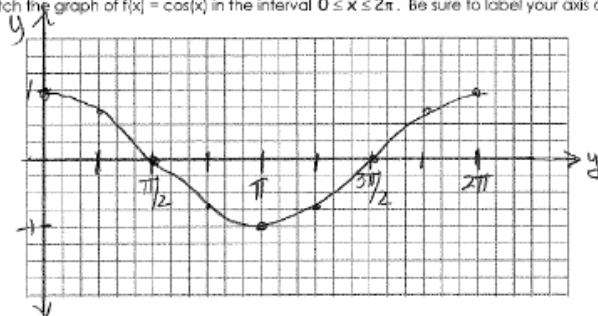
Algebra 2 Homework 11-1

1. Sketch the graph of  $f(x) = \sin(x)$  in the interval  $0 \leq x \leq 2\pi$ . Be sure to label your axis as in class.



2. a. What is the largest value of  $f(x) = \sin(x)$ ? 1  
 b. What is the smallest value of  $f(x) = \sin(x)$ ? -1
3. What is the range of  $f(x) = \sin(x)$ ?  $[-1, 1]$  or  $\{y \mid -1 \leq y \leq 1\}$
4. For what value(s) of  $x$  in the interval  $0 \leq x \leq 2\pi$  is  $\sin(x) = 1$ ?  $x = \pi/2$
5. For what value(s) of  $x$  in the interval  $0 \leq x \leq 2\pi$  is  $\sin(x) = -1$ ?  $x = 3\pi/2$
6. Between what values in the interval  $0 \leq x \leq 2\pi$  is  $\sin(x)$ :
- a. increasing?  $(0, \pi/2)$  and  $(3\pi/2, 2\pi)$
- b. decreasing?  $(\pi/2, 3\pi/2)$

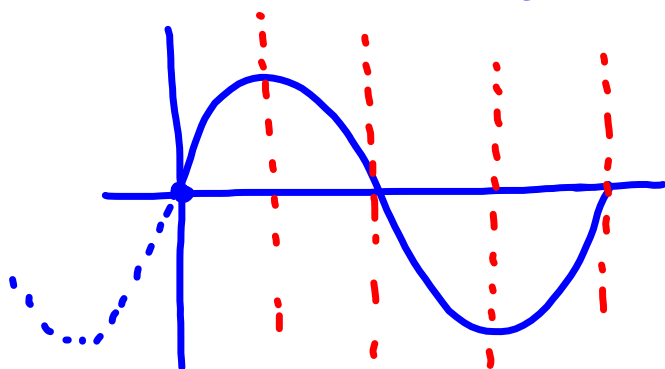
7. Sketch the graph of  $f(x) = \cos(x)$  in the interval  $0 \leq x \leq 2\pi$ . Be sure to label your axis as in class.



8. a. What is the largest value of  $f(x) = \cos(x)$ ?  $1$   
 b. What is the smallest value of  $f(x) = \cos(x)$ ?  $-1$
9. What is the range of  $f(x) = \cos(x)$ ?  $[-1, 1]$
10. For what value(s) of  $x$  in the interval  $0 \leq x \leq 2\pi$  is  $\cos(x) = 1$ ?  $\{0, 2\pi\}$
11. For what value(s) of  $x$  in the interval  $0 \leq x \leq 2\pi$  is  $\cos(x) = -1$ ?  $\{\pi\}$
12. Between what values in the interval  $0 \leq x \leq 2\pi$  is  $\cos(x)$ :  
 a. increasing?  $(\pi, 2\pi)$   
 b. decreasing?  $(0, \pi)$

Day 2: Review Basic Sine, Cosine and Tangent Graphs  
Amplitude, Frequency, Period, Domain & Range, x interval

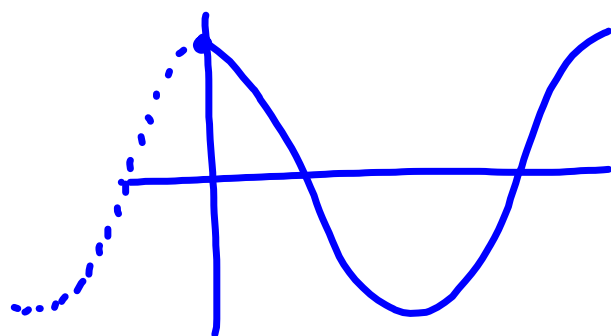
Sketch  $f(x) = \sin(x)$ . Is this function odd or even? odd  
How do you know? origin



look like  
"S"

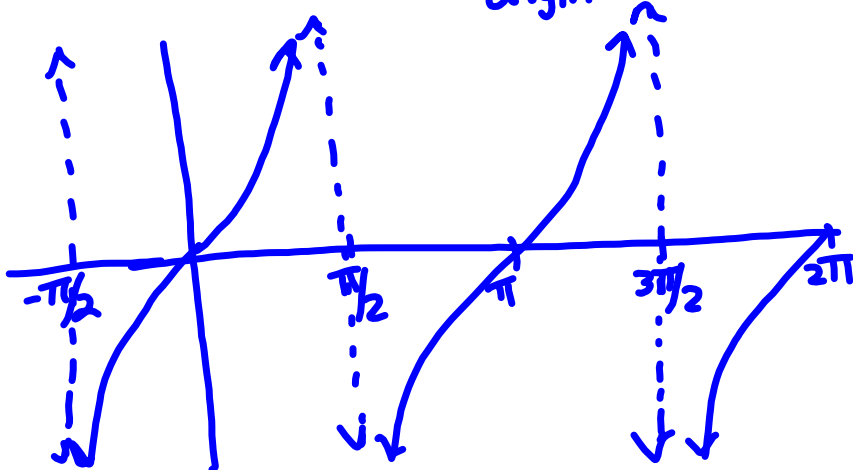
Sketch  $f(x) = \cos(x)$ . Is this function odd or even? even

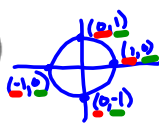
How do you know? y-axis



looks like  
"C"

Sketch  $f(x) = \tan(x)$ . Is this function odd or even? odd  
How do you know? origin



$f(x) = A \sin(\omega(x)) + k$  (0, 1, 0, -1, 0)   $f(x) = A \cos(\omega(x)) + k$  (1, 0, -1, 0, 1)

$|A| \rightarrow$  amplitude  $\rightarrow$  height above and below the midline  $\left( \frac{\text{max} - \text{min}}{2} \right)$

$\frac{|\omega|}{2\pi} \rightarrow$  frequency  $\rightarrow |\omega|$  cycles in  $2\pi$

$\frac{2\pi}{|\omega|} \rightarrow$  period  $\rightarrow$  length of 1 cycle

$y = k \rightarrow$  midline (vert. shift)

interval on x-axis =  $\frac{\text{Period}}{4} =$  distance between pattern points on the x-axis



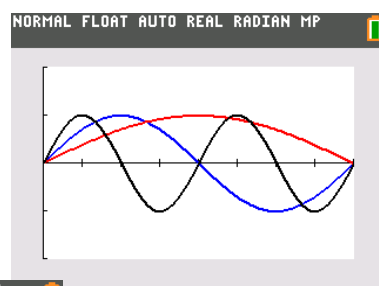
On calculator:

$$f(x) = \sin(x) \quad - \text{1 cycle in } 2\pi$$

$$f(x) = \sin(\frac{1}{2}x) \quad - \frac{1}{2} \text{ cycle in } 2\pi$$

$$f(x) = \sin(2x) \quad - \text{2 cycles in } 2\pi$$

$\uparrow$   
 $w = \# \text{ of cycles in } 2\pi$



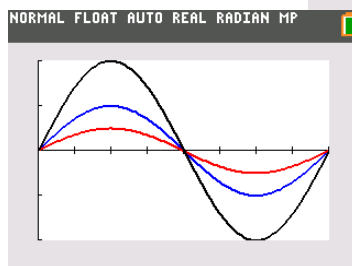
On calculator:

$$f(x) = \sin(x) \quad = \text{Amp} = 1$$

$$f(x) = \frac{1}{2}\sin(x) \quad = \text{Amp} = \frac{1}{2}$$

$$f(x) = 2\sin(x) \quad = \text{Amp} = 2$$

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

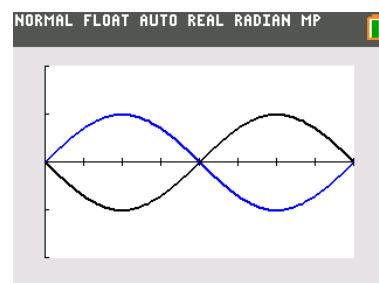


On calculator:

$$f(x) = \sin(x)$$

$$f(x) = -\sin(x)$$

$\uparrow$   
 $\uparrow x\text{-axis}$



## Amplitude with Frequency Changes

1. Given  $f(x) = 3 \sin(2x)$  tell  $(0 \leq x \leq 2\pi)$
- a. amplitude  $|A| = |3| = 3$

$$A(0, 1, 0, -1, 0)$$

$$3(0, 1, 0, -1, 0)$$

$$0, 3, 0, -3, 0$$

- b. range  $[-3, 3]$

- c. frequency  $= \frac{\omega}{2\pi} = 2 \text{ cycles in } 2\pi$

- d. period  $= \frac{2\pi}{\omega} = \frac{2\pi}{2} = \pi$  (length of 1 cycle)

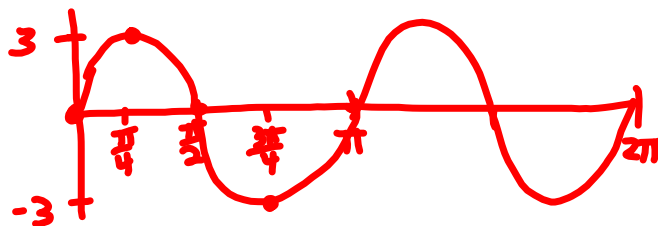
- e. interval on x-axis  $\frac{\text{Per}}{4} = \frac{\pi}{4}$

- f. describe the following:

- i. minimums  $\rightarrow -3$

- ii. maximums  $\rightarrow 3$

- iii. zeros  $\rightarrow 0, \pi/2, \pi, 3\pi/2, 2\pi$



2. Given  $f(x) = -2 \cos(\frac{1}{2}x)$  tell  $(-2\pi \leq x \leq 2\pi)$   $A(1, 0, -1, 0, 1)$   
 $-2(1, 0, -1, 0, 1) \leftarrow y's$   
 $-2, 0, 2, 0, -2$
- a. amplitude  $|-2| = 2$
- b. range  $[-2, 2]$
- c. frequency  $\frac{1}{2}$  cycle in  $2\pi$
- d. period  $\frac{2\pi}{\frac{1}{2}} = \frac{2\pi}{\frac{1}{2}} = 2\pi \cdot 2 = 4\pi$  (length of 1 cycle)
- e. interval on x-axis  $\frac{4\pi}{4} = \frac{4\pi}{4} = \pi$  x's
- f. describe the following:
- minimums  $\rightarrow -2$
  - maximums  $\rightarrow 2$
  - zeros  $\rightarrow -\pi, \pi$

