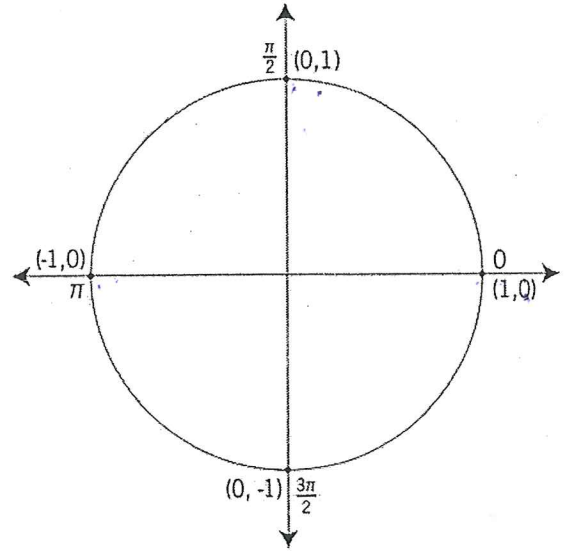
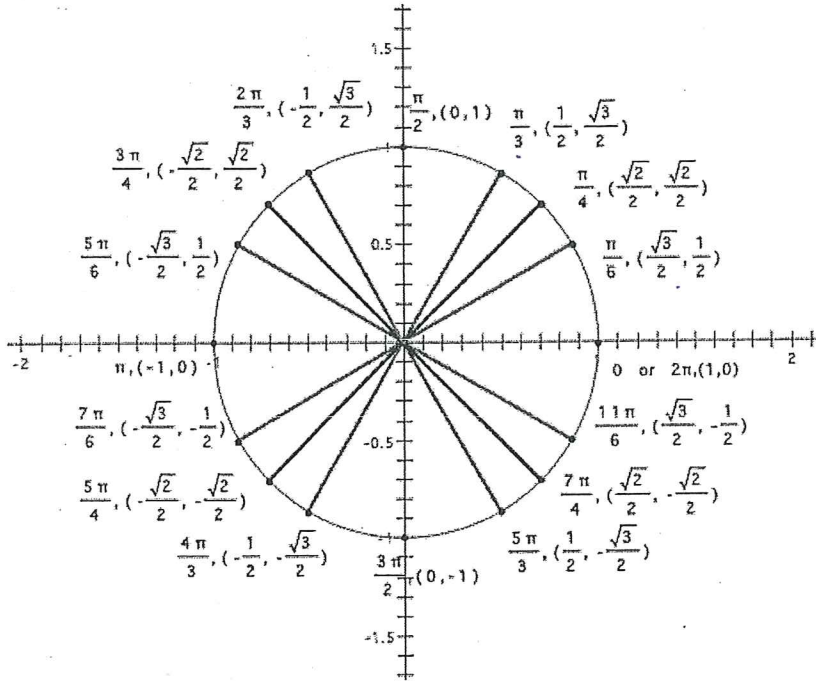


# 7.1 Graphs of Sine and Cosine

## Day 1 Cosine

Name: \_\_\_\_\_

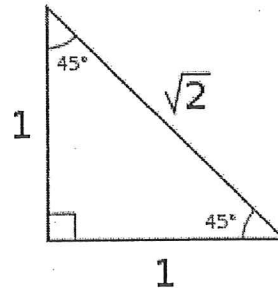
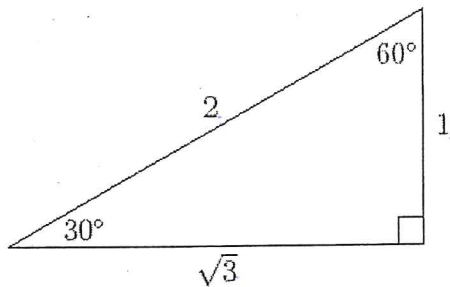
Date: \_\_\_\_\_ Hour: \_\_\_\_\_



$$30^\circ = \frac{\pi}{6}$$

$$45^\circ = \frac{\pi}{4}$$

$$60^\circ = \frac{\pi}{3}$$



$$\sin = \frac{y}{r}$$

$$\cos = \frac{x}{r}$$

$$\tan = \frac{y}{x}$$

Let us first use a T-Chart to introduce the Sine Function...

$$y = \sin x$$

**Example 1:** Graph  $f(t) = \sin t$

angle

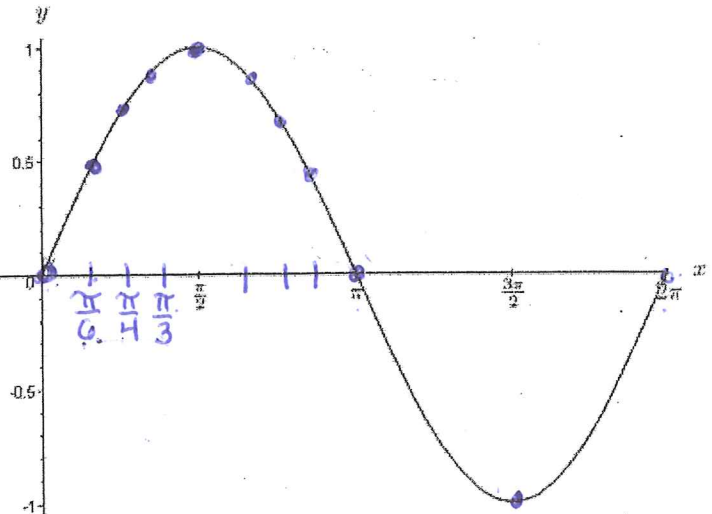
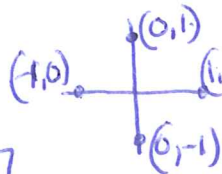
or

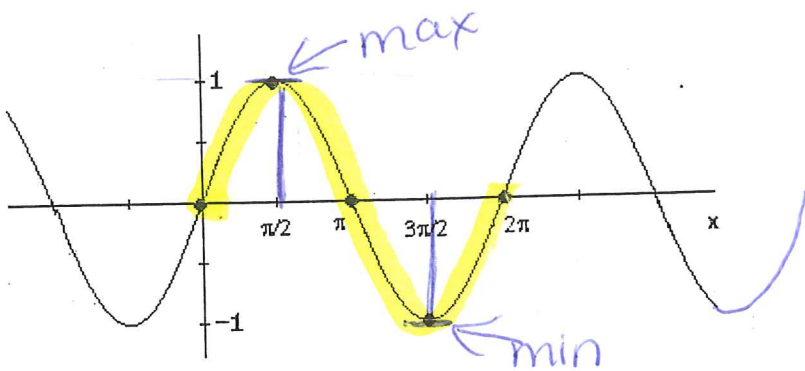
$$y = \sin t$$

$$\sin = \frac{y}{r}$$

$f(t)$

$x$ $t$	$f(t)$
0	0
$\pi/6$	$1/2$
$\pi/4$	$1/\sqrt{2} \approx .71$
$\pi/3$	$\sqrt{3}/2 \approx .87$
$\pi/2$	1
$\pi$	0
$3\pi/2$	-1
$2\pi$	0





If we were to extend our table and graph from Example 1, we would get a graph that looks like the one on the left.

The graph from Example 1 represents **one full period** of a sine curve. This is from the interval  $[0, 2\pi]$ .

A **period** is one complete cycle around the unit circle. (In this case it would be  $2\pi$ )

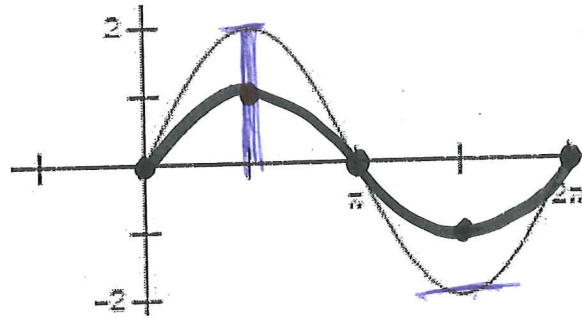
The **max** is 1, and the **min** is -1.

The **amplitude** is the height off of the x-axis. Think of this as a vertical stretch of the graph. (In this case the amplitude is 1)

**Example 2:**  $f(t) = 2\sin t$

multiply the y values by 2

t	f(t)
0	0
$\pi/2$	2
$\pi$	0
$3\pi/2$	-2
$2\pi$	0



Period:  $[0, 2\pi]$

Max: 2

Min: -2

Amplitude: 2

Domain:  $all$

Range:  $[-2, 2]$

Notice that both sine curves start at the origin!

**Example 3:**  $f(t) = -\sin t$

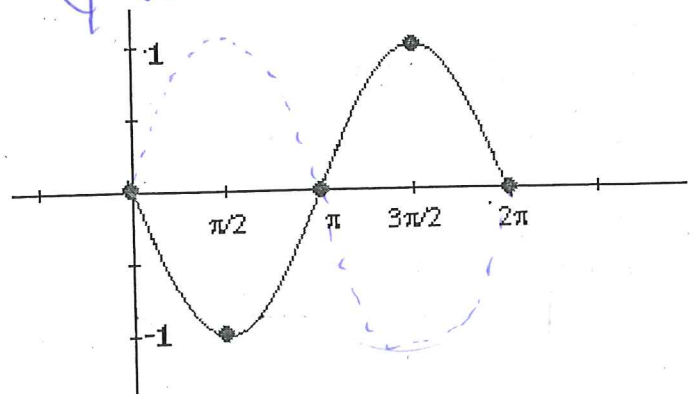
Reflection over the x-axis.

Change all y to -y

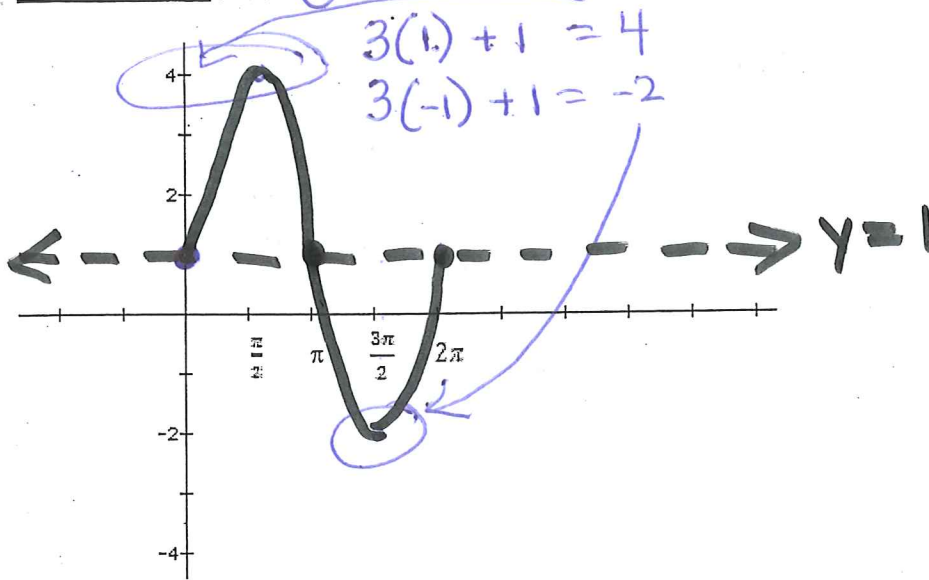
$y = -\sin t$

multiply the y values by -1

t	f(t)
0	0
$\pi/2$	-1
$\pi$	0
$3\pi/2$	1
$2\pi$	0



Example 4:  $f(t) = 3\sin t + 1$  ← new x axis



Period:  $[0, 2\pi]$   
 Max: 4  
 Min: -2  
 Amplitude: 3  
 Domain: am  
 Range:  $[-2, 4]$

$$f(t) = a \sin t + d$$

Amplitude  
or height

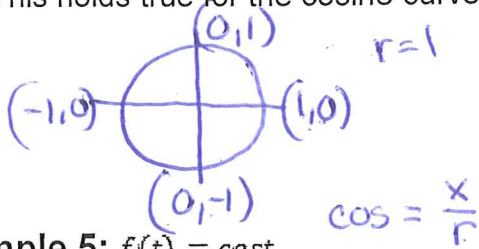
Vertical shift  
up or down

### Domain and Range

The domain of the sine and cosine functions is the set of **all real numbers**.

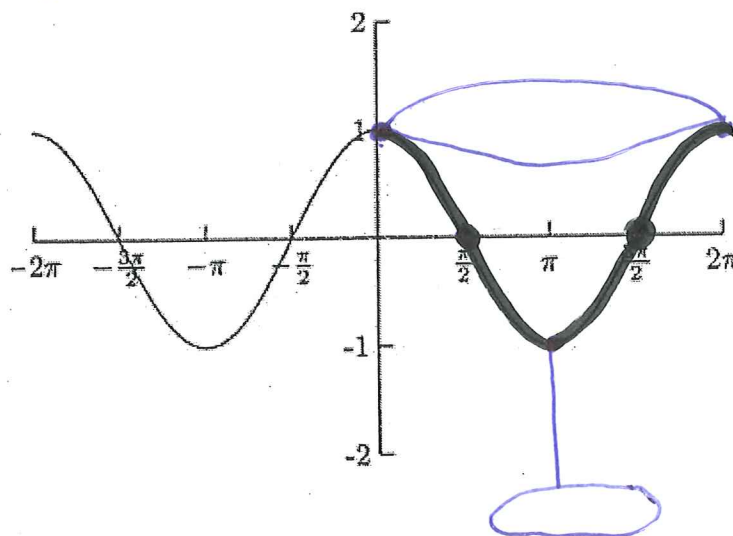
The range of the sine and cosine function is the interval  $[-1, 1]$ .

\*This holds true for the cosine curve too!\*



Example 5:  $f(t) = \cos t$

t	f(t)
0	1
$\frac{\pi}{2}$	0
$\pi$	-1
$\frac{3\pi}{2}$	0
$2\pi$	1



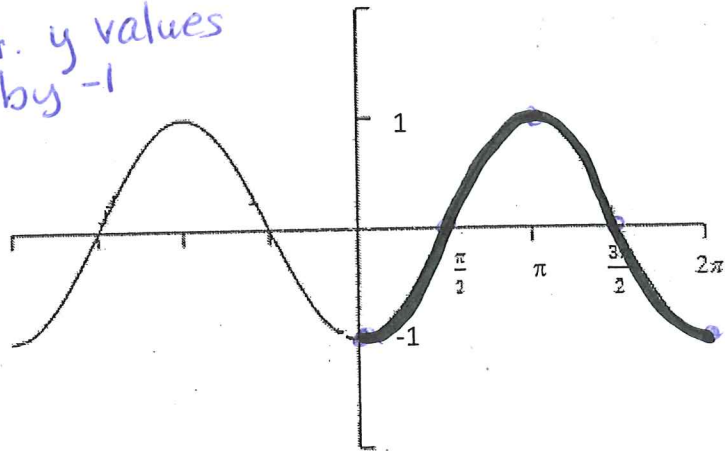
Period:  $[0, 2\pi]$   
 Max: 1  
 Min: -1  
 Amplitude: 1  
 Domain: am  
 Range:  $[-1, 1]$

**Example 6:**  $f(t) = -\cos t$

reflect over x axis  
mult. y values by -1

Reflection over the x-axis.

In Example 5 the curve began "high". This curve will begin "low".



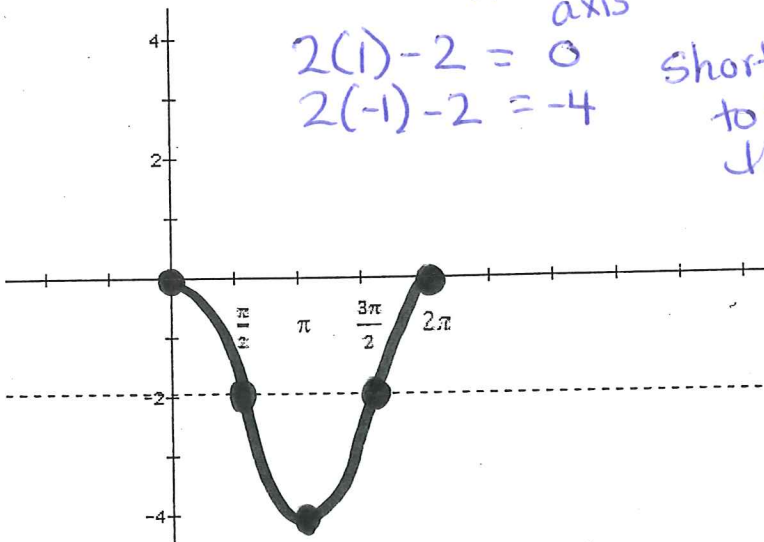
Cosine curves begin either "high" or "low".

**Example 7:**  $f(t) = 2\cos t - 2$

new x axis

$2(1) - 2 = 0$   
 $2(-1) - 2 = -4$

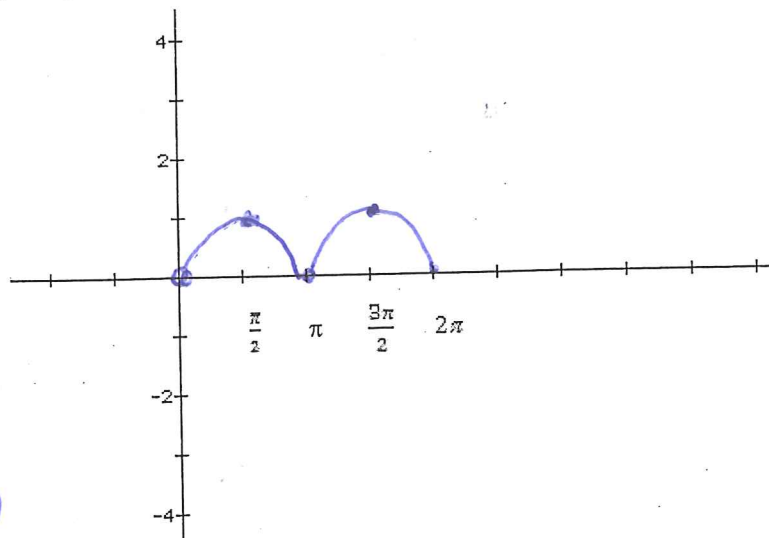
Shortcut to find the range



Period:  $(0, 2\pi]$   
Max:  $0$   
Min:  $-4$   
Amplitude:  $2$   
Domain:  $\text{all}$   
Range:  $[-4, 0]$

**Example 8:**  $f(t) = |\sin t|$

t	f(t)
0	0
$\frac{\pi}{2}$	1
$\pi$	0
$\frac{3\pi}{2}$	1
$2\pi$	0



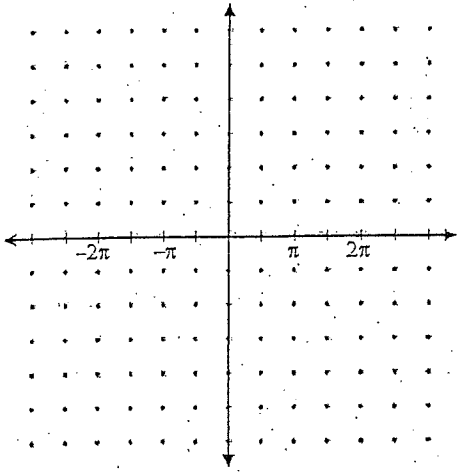
Period:  $(0, 2\pi]$   
Max:  $1$   
Min:  $0$   
Amplitude:  $1$   
Domain:  $\text{all}$   
Range:  $[0, 1]$

PreCalculus  
Worksheet 7.1  
Graphing Sine and Cosine

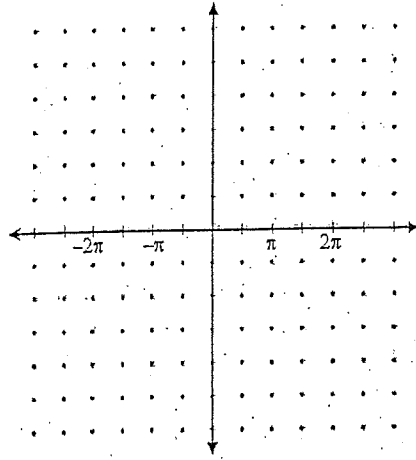
Name \_\_\_\_\_

Graph the following sine and cosine functions for  $-2\pi \leq t \leq 2\pi$ .

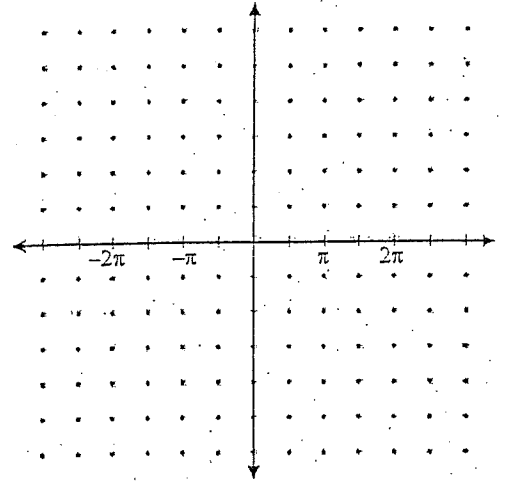
1.  $f(x) = \cos t - 2$



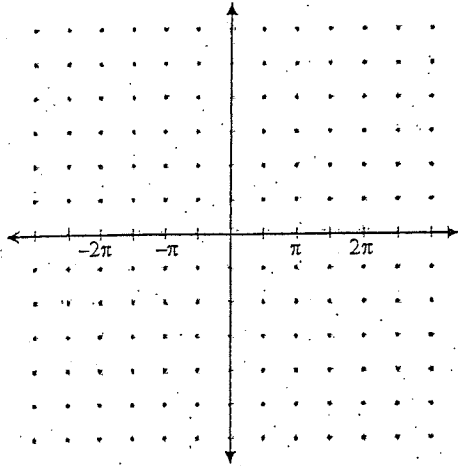
2.  $f(x) = \sin t + 1$



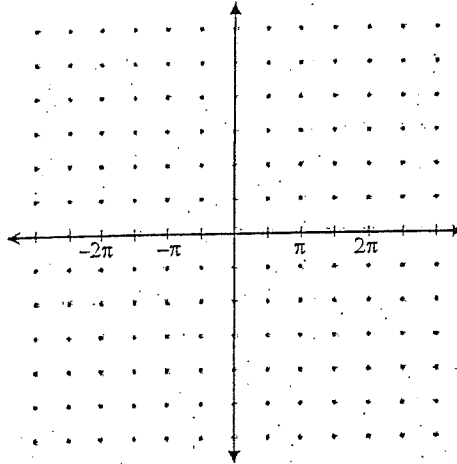
3.  $f(x) = 4 - \sin t$



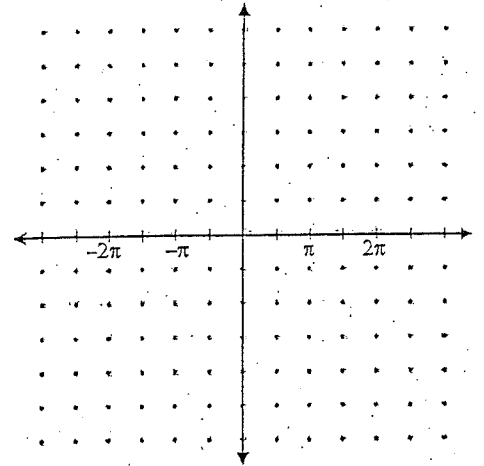
4.  $f(x) = -\cos t + 3$



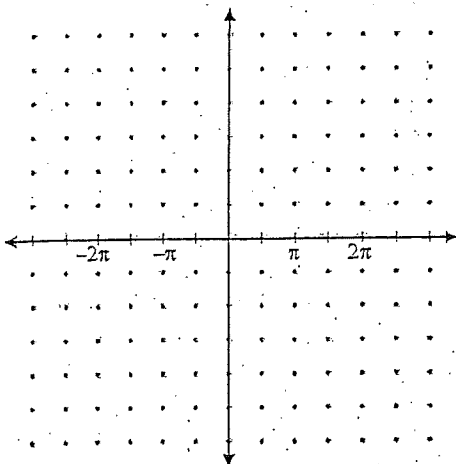
5.  $f(x) = |\sin t|$



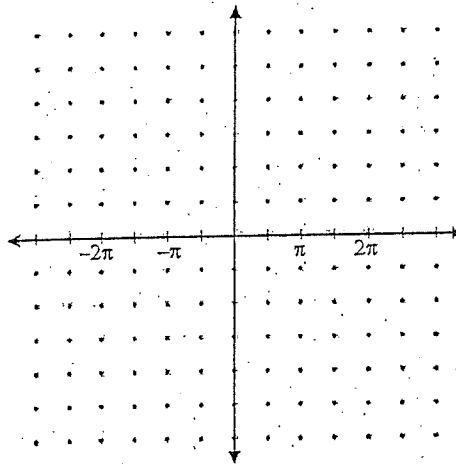
6.  $f(x) = -|\cos t|$



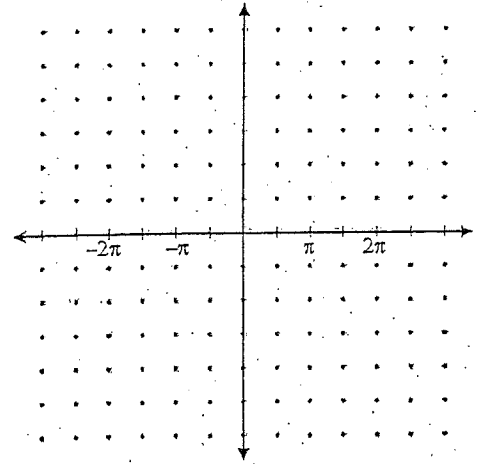
7.  $f(x) = |\sin t| + 2$



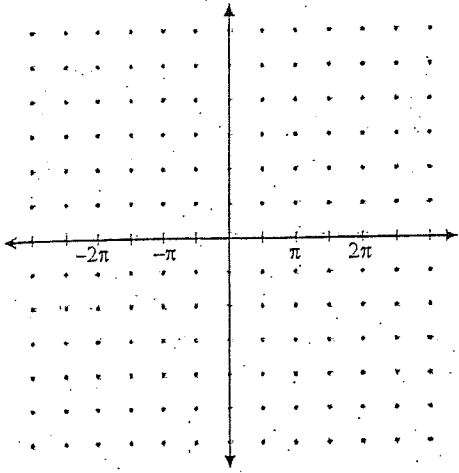
8.  $f(x) = 2 - |\sin t|$



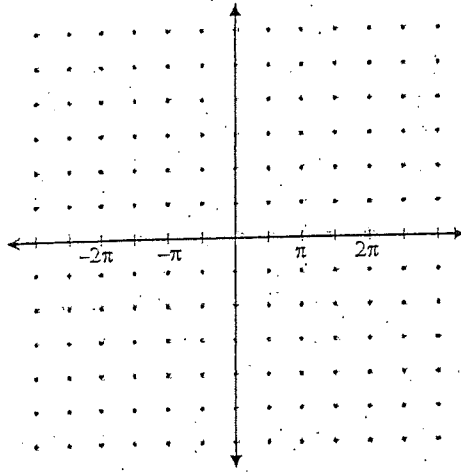
9.  $f(x) = 3 \sin t$



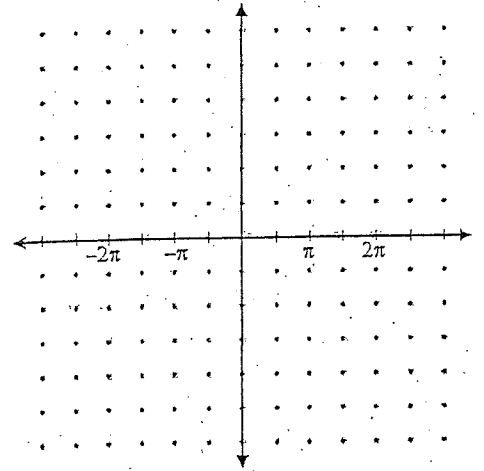
10.  $f(x) = -3 \cos t$



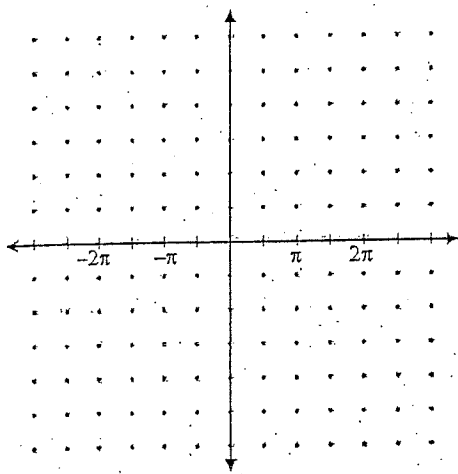
11.  $f(x) = -2 \sin t$



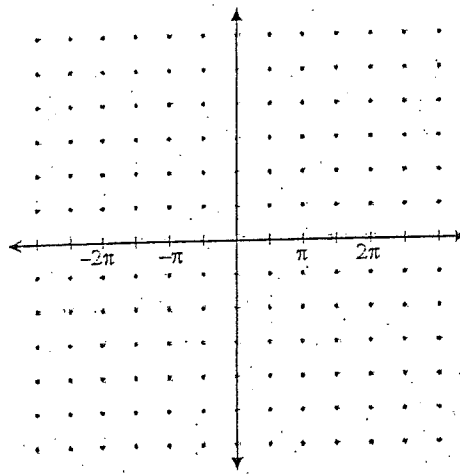
12.  $f(x) = \frac{1}{2} \cos t$



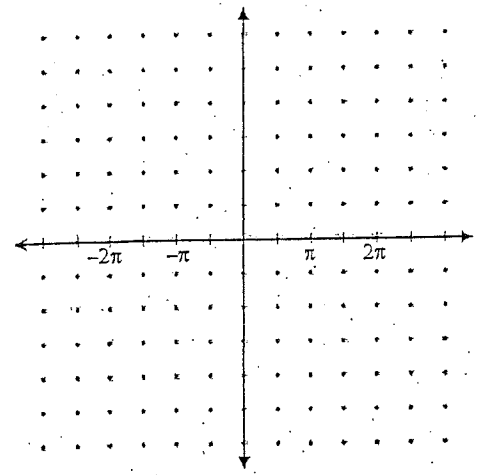
13.  $f(x) = 3 \sin t + 2$



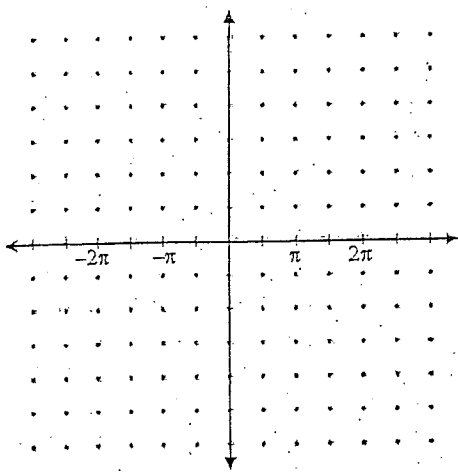
14.  $f(x) = -\cos t - 1$



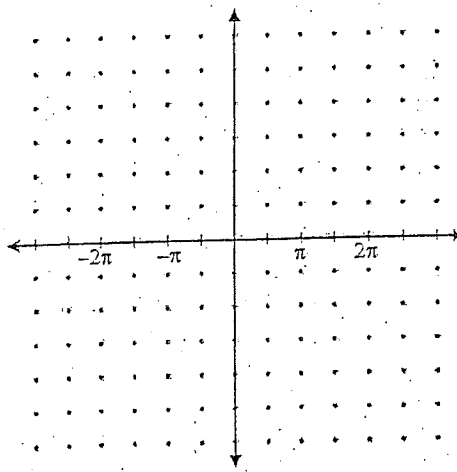
15.  $f(x) = -\frac{1}{4} \cos t - \frac{1}{4}$



16.  $f(x) = -2 \sin t - \frac{1}{2}$



17.  $f(x) = 2 + 2|\sin t|$



18.  $f(x) = -3 \sin t - 2$

