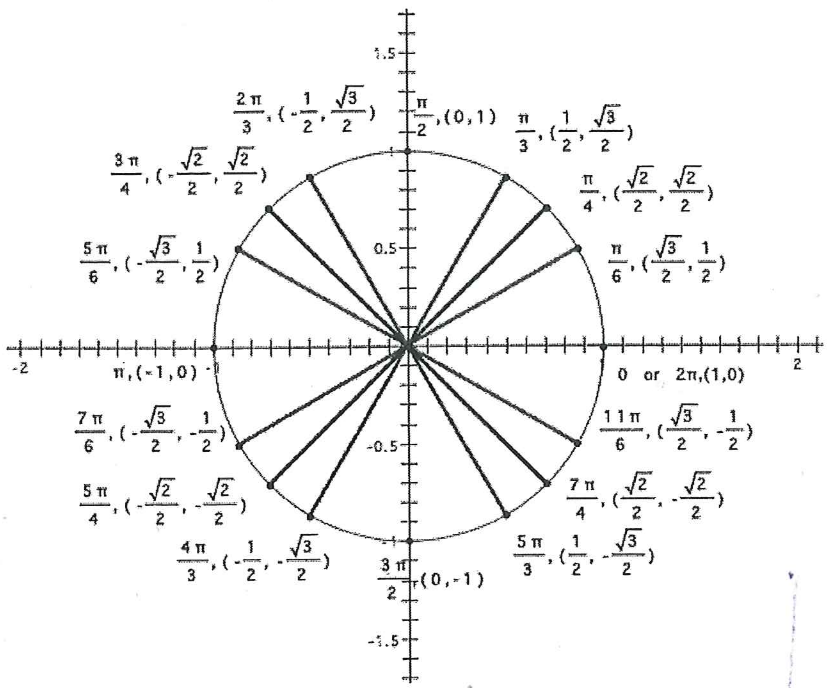
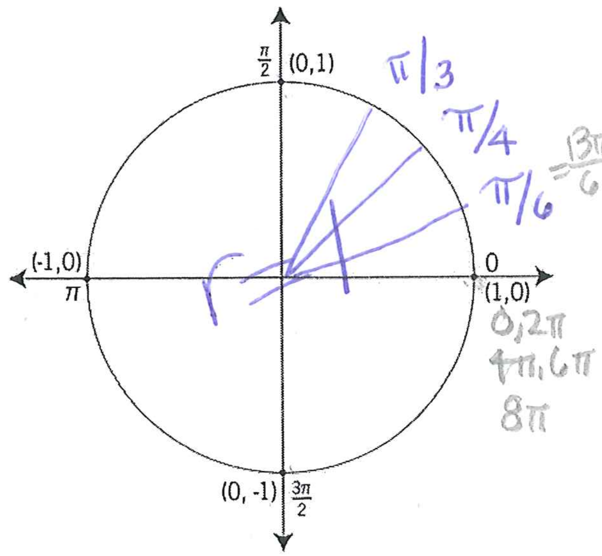
13 Graphs of Sine
Cosine

Day 1

Name:________________________________

Date:________________ Hour:____________

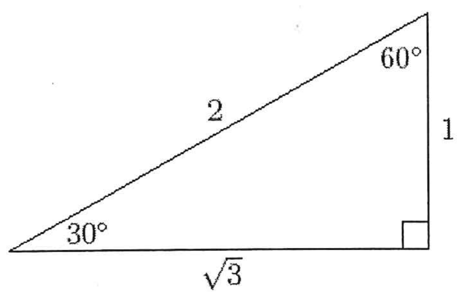


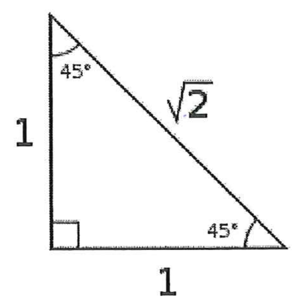


$30° = \frac{\pi}{6}$

$45° = \frac{\pi}{4}$

$60° = \frac{\pi}{3}$





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

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

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

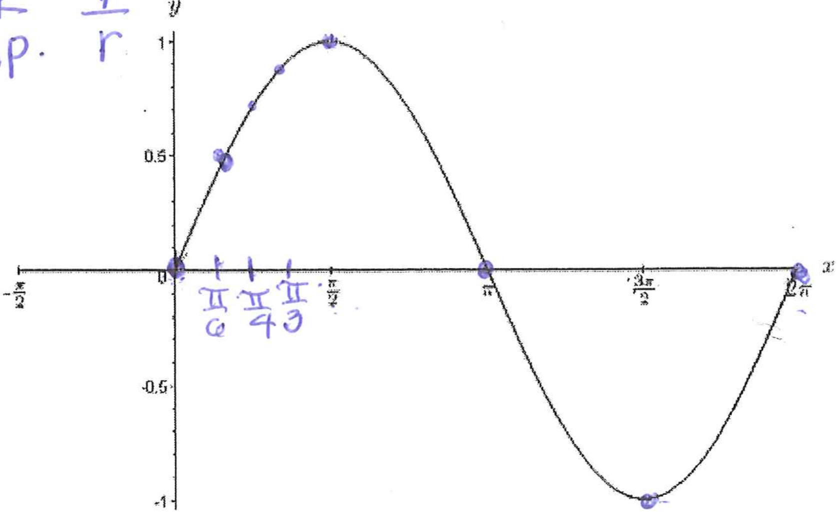
Let us first use a T-Chart to introduce the Sine Function…

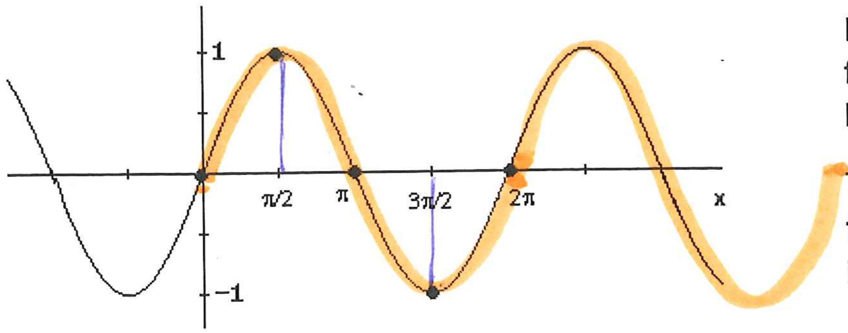
Sin = $\frac{\text{opp}}{\text{hyp.}}$ $\frac{y}{r}$

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

or $y = \sin t$

angles t	ratios f (t)
0	0
$30° = \frac{\pi}{6}$	$1/2 = .5$
$45° = \frac{\pi}{4}$	$\frac{1}{\sqrt{2}} \approx .7$
$60° = \frac{\pi}{3}$	$\sqrt{3}/2 \approx .87$
$\frac{\pi}{2}$	1



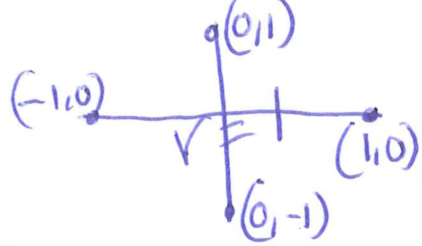


If we were to extend our table and graph from Example 1, we would get a graph that looks like the one on the left.

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

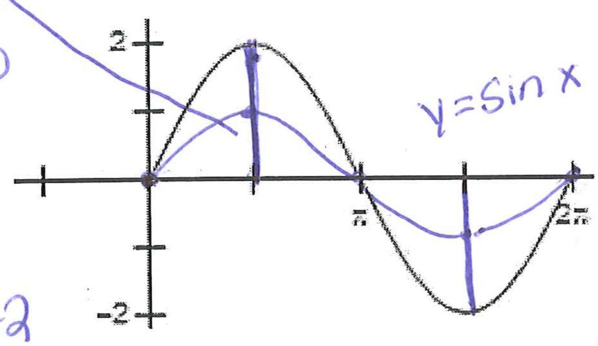
A **period** is one complete cycle around the unit circle. (In this case it would be 2π)
The **max** is 1, and the **min** is -1.
The **amplitude** is the height off of the x-axis. Think of this as a vertical stretch of the graph. (In this case the amplitude is 1)

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



Example 2: $f(t) = 2sint$

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



Period: [0, 2π]

Max: 2

Min: -2

Amplitude: 2

Domain: all

Range: [-2, 2]

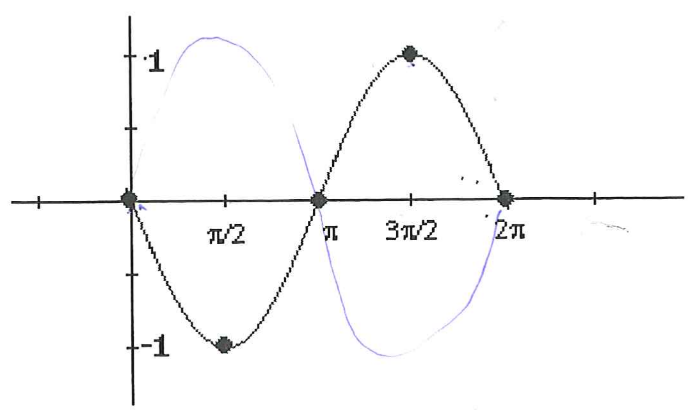
Notice that both sine curves start at the origin!

Example 3: $f(t) = -sint$ reflects over the axis

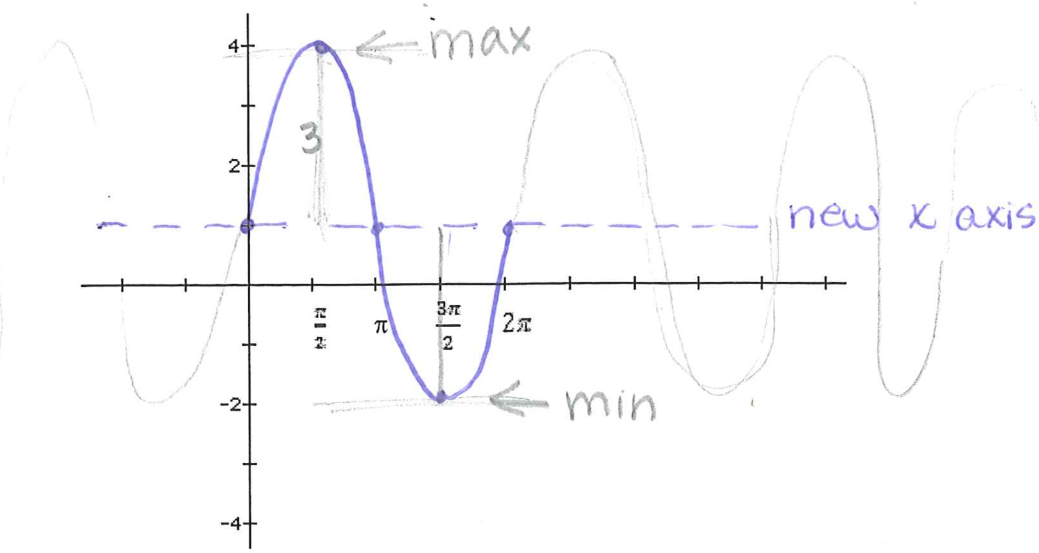
Reflection over the x-axis.

Change all y to -y

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



Example 4: $f(t) = 3sint + 1$ ← amp 3 ← up 1 unit



Period: $[0, 2\pi]$

Max: 4

Min: -2

Amplitude: 3

Domain: arn

Range: $[-2, 4]$

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

Amplitude or height

Vertical shift up or down

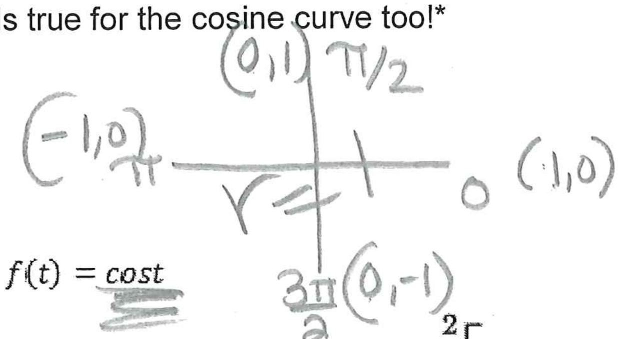
This holds true for the cosine curve too!

Domain and Range

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

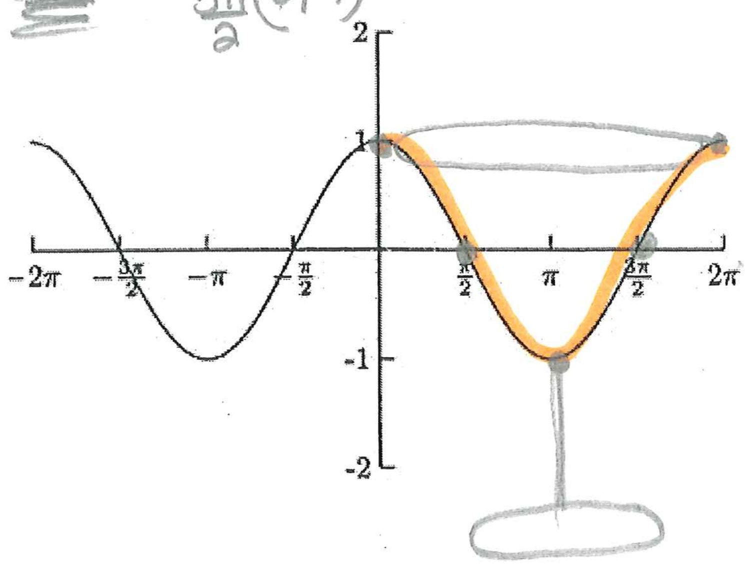
The range of the sine and cosine function is the interval **[-1,1]**.

$\frac{x}{r}$



Example 5: $f(t) = cost$

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



Period: $[0, 2\pi]$

Max: 1

Min: -1

Amplitude: 1

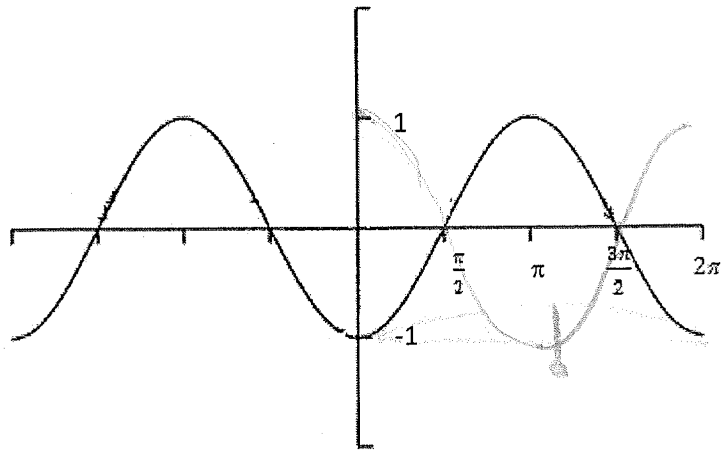
Domain: arn

Range: $[-1, 1]$

Example 6: $f(t) = -cost$

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: $f(t) = 2cost - 2$ 2down

Period: [0, 2π]

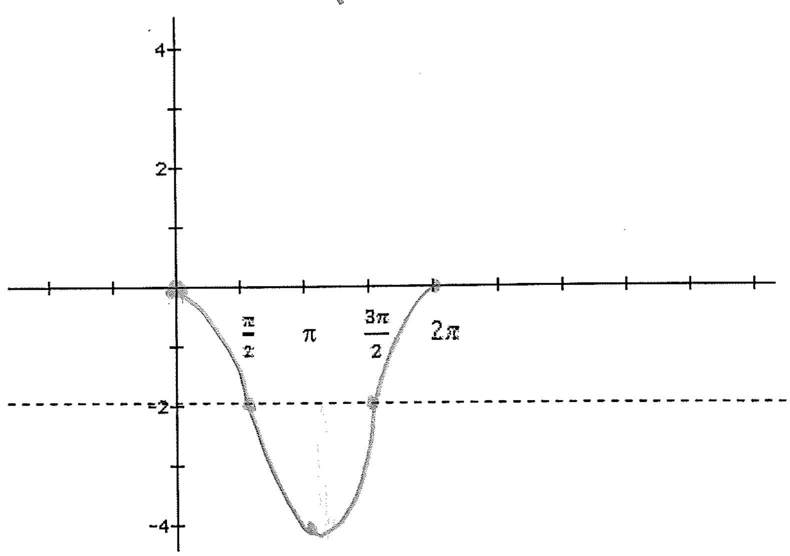
Max: 0

Min: -4

Amplitude: 2

Domain: arn

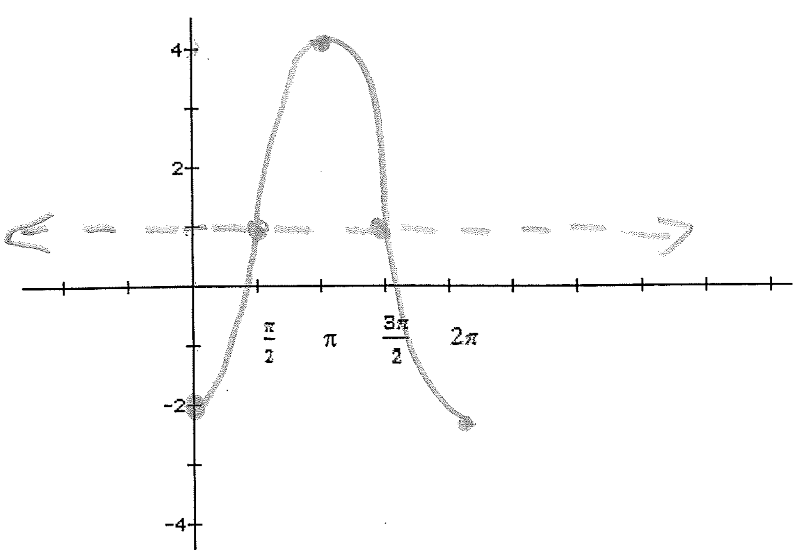
Range: [-4, 0]



new x-axis

Example 8: $f(t) = -3\cos t + 1$

t	f (t)



Period: [0, 2π]

Max: 4

Min: -2

Amplitude: 3

Domain: arn

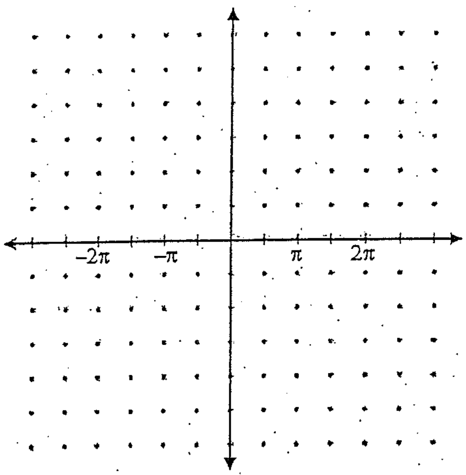
Range: [-2, 4]

Algebra 2
Worksheet 13.4 -13.5
Graphing Sine and Cosine

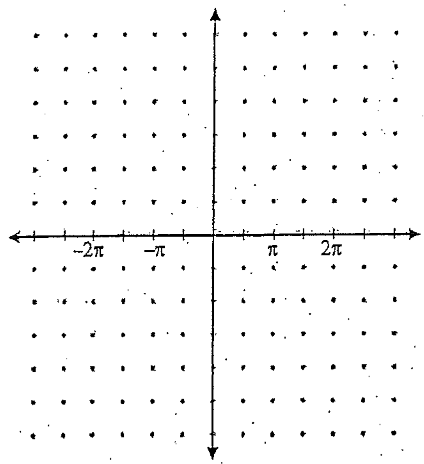
Name__________________________________

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

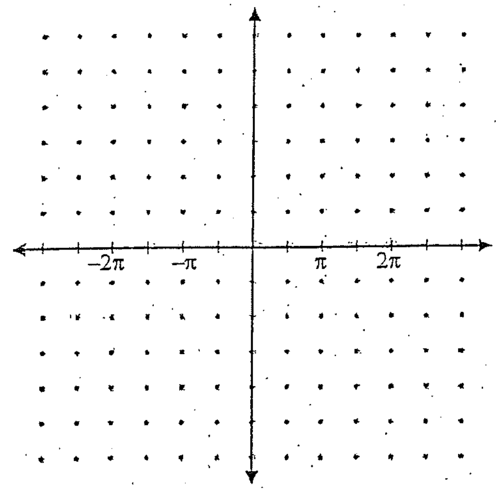
1. $f(x)=\cos x-2$



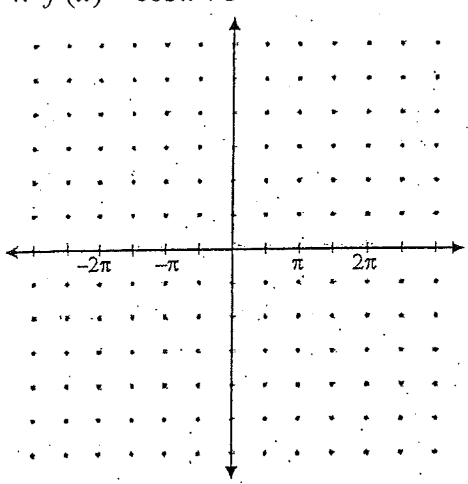
2. $f(x)=\sin x+1$



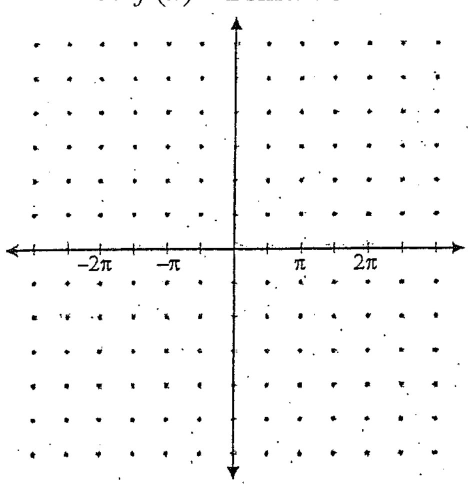
3. $f(x)=\sin x-3$



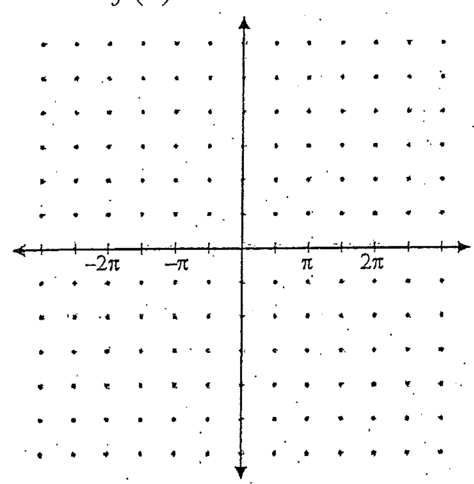
4. $f(x)=\cos x+3$



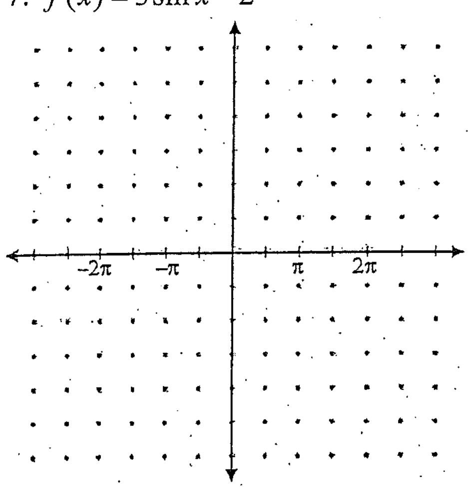
5. $f(x)=2\sin x+3$



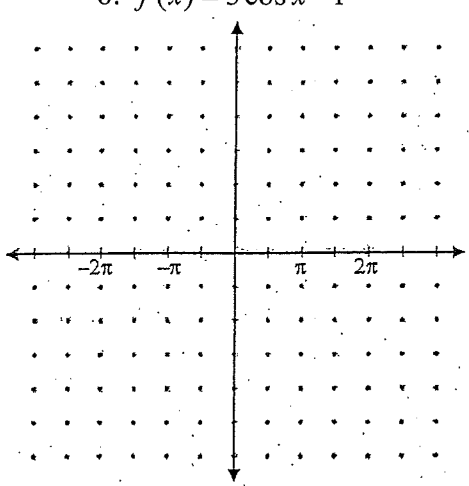
6. $f(x)=2\cos x-3$



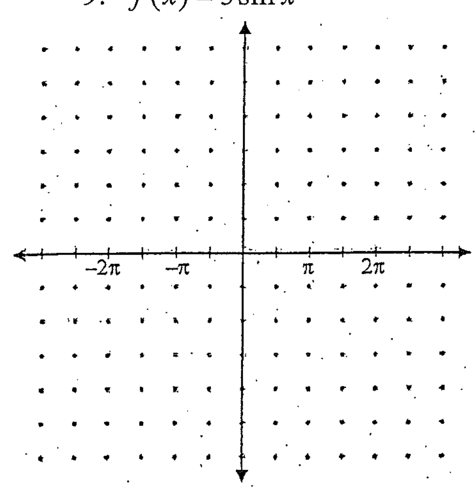
7. $f(x)=3\sin x-2$



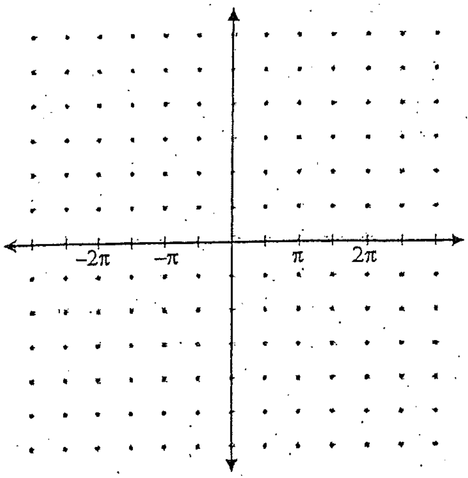
8. $f(x)=3\cos x-1$



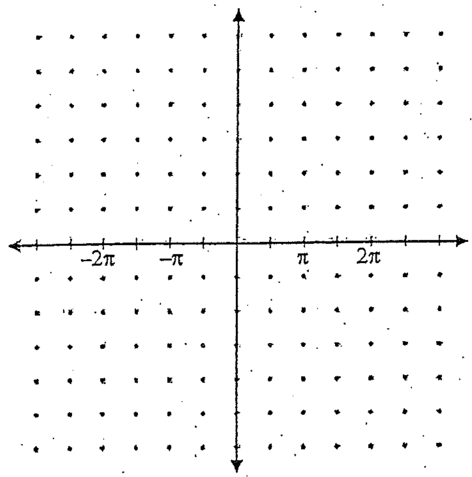
9. $f(x)=3\sin x$



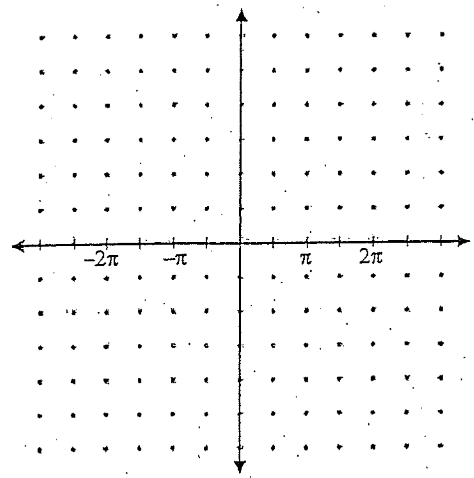
10. $f(x) = -3\cos t$



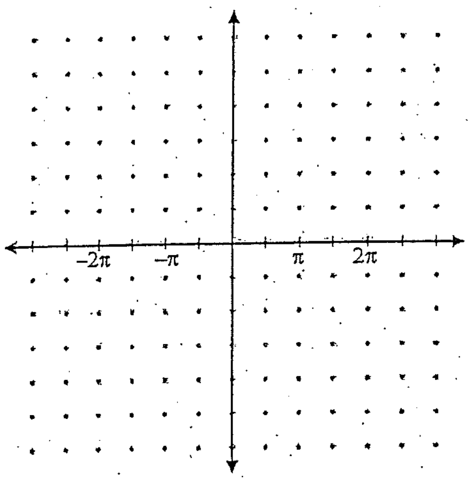
11. $f(x) = -3\sin t$



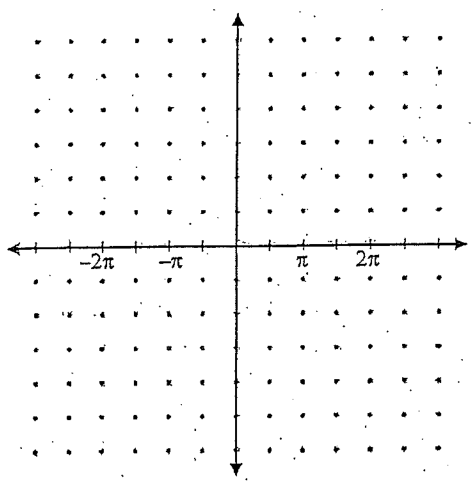
12. $f(x) = \frac{1}{2}\cos t$



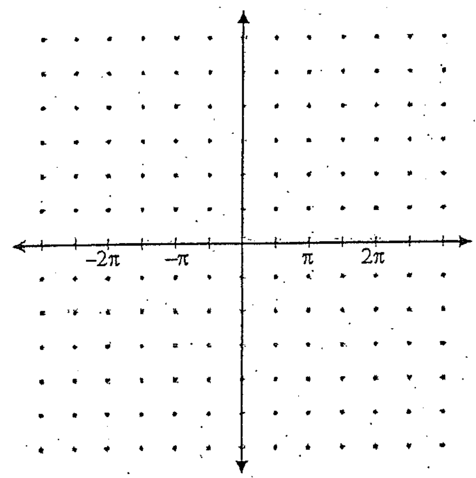
13. $f(x) = 3\sin t + 2$



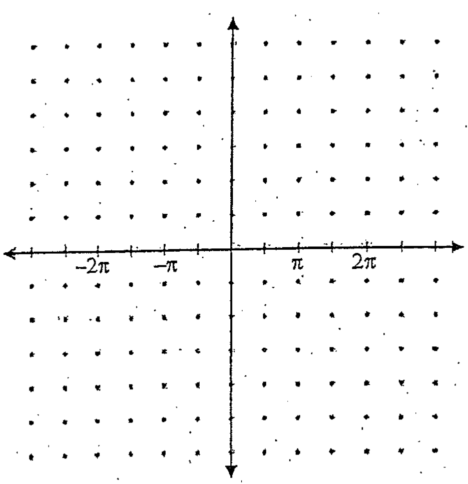
14. $f(x) = -\cos t - 1$



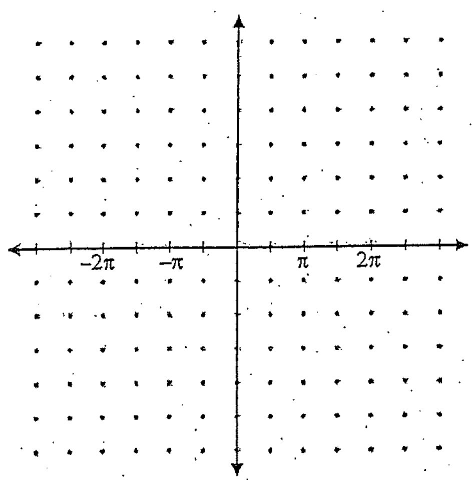
15. $f(x) = \frac{3}{4}\sin t$



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



17. $f(x) = -3\sin x$



18. $f(x) = 5\sin t - 1$