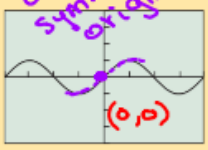
Section 4.4 Graphs of sin and cos.

odd sym. origin



[−2π, 2π] by [−4, 4]

FIGURE 4.37A

BASIC FUNCTION The Sine Function

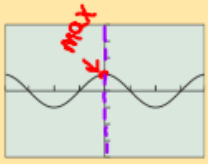
$f(x) = \sin x$
Domain: All reals
Range: $[-1, 1]$
Continuous
Alternately increasing and decreasing in periodic waves
Symmetric with respect to the origin (odd)
Bounded
Absolute maximum of 1
Absolute minimum of -1
No horizontal asymptotes
No vertical asymptotes
End behavior: $\lim_{x\to-\infty} \sin x$ and $\lim_{x\to\infty} \sin x$ do not exist. (The function values continually oscillate between -1 and 1 and approach no limit.)

$y = x^2$ even

$y = x^3$ odd.

Periodic

No limit



[−2π, 2π] by [−4, 4]

FIGURE 4.38A

BASIC FUNCTION The Cosine Function

$f(x) = \cos x$
Domain: All reals
Range: $[-1, 1]$
Continuous
Alternately increasing and decreasing in periodic waves
Symmetric with respect to the y-axis (even)
Bounded
Absolute maximum of 1
Absolute minimum of -1
No horizontal asymptotes
No vertical asymptotes
End behavior: $\lim_{x\to-\infty} \cos x$ and $\lim_{x\to\infty} \cos x$ do not exist. (The function values continually oscillate between -1 and 1 and approach no limit.)

even symmetrical with respect to y-axis

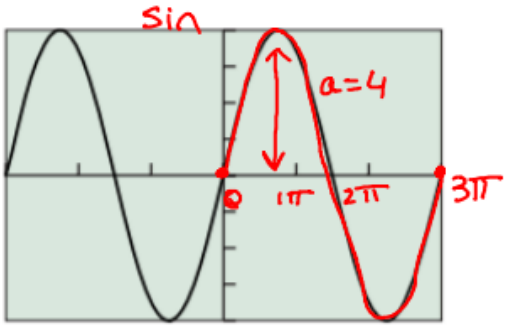
p350.

sin	cos
starts at 0	starts at 1 (parent)
$\sin 0 = 0$	$\cos 0 = 1$
	cos starts at max or min
odd	even

$f(x) = a\sin(bx+c)+d$

$f(x) = a\cos(bx+c)+d$

- $|a|$ amplitude half of the wave
- period T $\frac{2\pi}{|b|}$ length of a full cycle
- frequency $\frac{1}{T} = \frac{|b|}{2\pi}$ number of complete cycle in a unit interval.



$y = 4\sin\left(\frac{2x}{3}\right)$

$a = 4$ amplitude

$b = \frac{2}{3}$

$c = 0$

$d = 0$

$T = \frac{2\pi}{|b|} = \frac{2\pi}{\frac{2}{3}} = 3\pi$

1 full cycle gets completed in 3π interval

$f = \frac{1}{T} = \frac{1}{3\pi}$

Hw pg 357 1–6, 7-12, 13-16, 29-34

$a=?$ $T?$ $f?$ window

See example in notes.