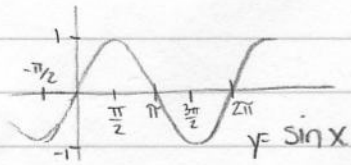
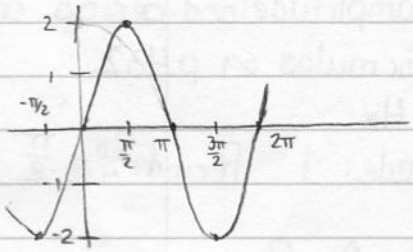
5.3

5. Graph $y = -2\sin x$

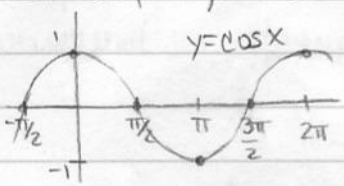


Flip around x-axis, stretch vertically by 2

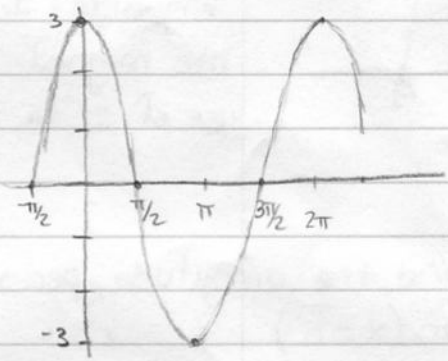


Tip: Be sure you hit the right spots for the peaks, valleys, and x-intercepts. You might want to mark those points first, then connect them with the curve.

6. Graph $y = 3\cos x$

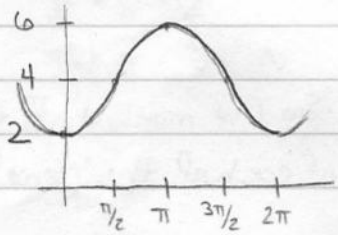


Stretch vertically



7. $y = 4 - 2\cos x$

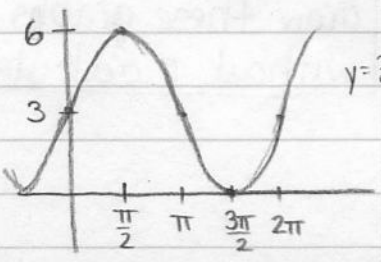
Flip about x-axis, stretch vertically by 2, shift upwards by 4.



$y = 4 - 2\cos x$

8. $y = 3 + 3\sin x$

Stretch vertically by 3, shift upwards by 3



$y = 3 + 3\sin x$

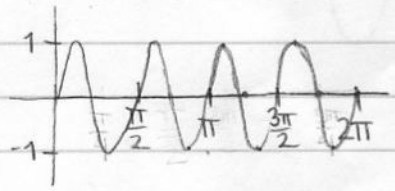
5.3 cont'd

11, 14 Find amplitude and period and sketch its graph.

Use the formulas on p. 432

11. $y = \cos 4x$

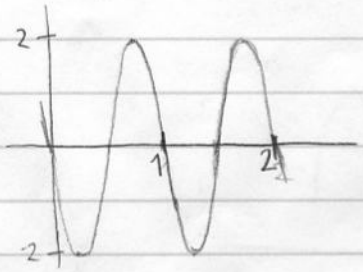
Amplitude: 1 Period $\frac{2\pi}{4} = \frac{\pi}{2}$



Notice that one period (one of these $\cup$) happens every $\frac{\pi}{2}$.

14. $y = -2 \sin 2\pi x$

Amplitude: 2 Period: $\frac{2\pi}{2\pi} = 1$



Why didn't I mark $\frac{\pi}{2}, \pi, \ldots$? Because they would do me no good. The period is 1, so it doesn't require the use of π to mark halfway, a quarter way, three quarters way, ...

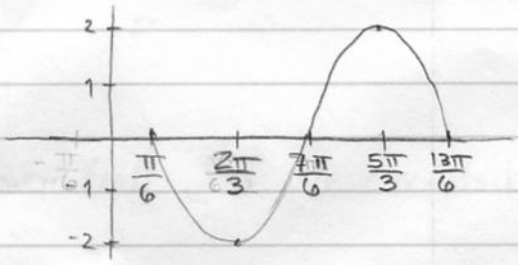
23, 25, 26 Find the amplitude, period, and phase shift, and graph one period.

23 $y = -2 \sin\left(x - \frac{\pi}{6}\right)$

Amplitude: 2

Period: $\frac{2\pi}{1} = 2\pi$

Phase shift: $\frac{\pi}{6}$



Why are these points on the x-axis marked?

$\frac{2\pi}{3} = \frac{\pi}{6} + \frac{\pi}{2}$

$\frac{7\pi}{6} = \frac{\pi}{6} + \pi$

$\frac{5\pi}{3} = \frac{\pi}{6} + \frac{3\pi}{2}$

$\frac{13\pi}{6} = \frac{\pi}{6} + 2\pi$

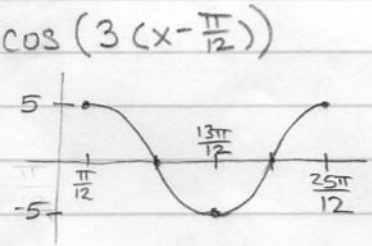
So I've marked $\frac{\pi}{6}$ to the right of each of the "normal" markings

25. $y = 5\cos\left(3x - \frac{\pi}{4}\right) = 5\cos\left(3\left(x - \frac{\pi}{12}\right)\right)$

Amplitude: 5

Period: $\frac{2\pi}{3}$

Phase shift: $\frac{\pi}{12}$



On the exam, you will be expected to draw these graphs without a calculator

26. $y = -4 \sin 2\left(x + \frac{\pi}{2}\right)$

Amplitude: 4

Period: $\frac{2\pi}{2} = \pi$

Phase shift: $\frac{-\pi}{2}$