Graphing secant and cosecant functions Name _____
Practice Worksheet

Example: $y = \sec\left(4x - \frac{\pi}{2}\right)$

$y = \sec 4\left(x - \frac{\pi}{8}\right)$

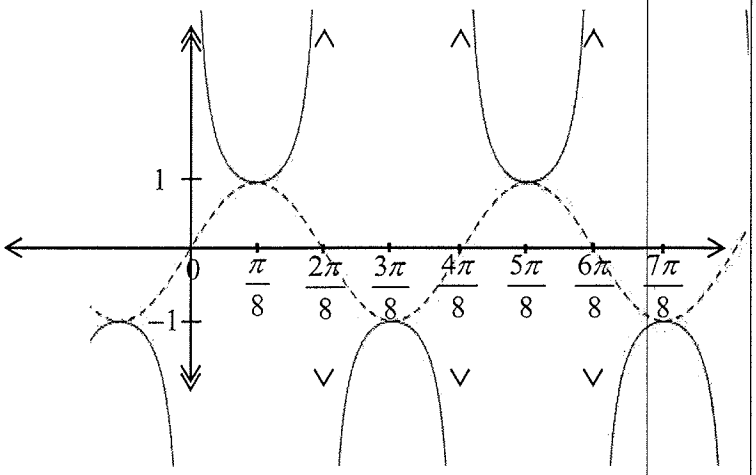
Reciprocal of $y = \cos 4\left(x - \frac{\pi}{8}\right)$

Amplitude = 1

period = $\frac{2\pi}{4} \rightarrow \frac{\pi}{2}$

vertical translation = none

phase shift = $\frac{\pi}{8}$ to the right



mark x-axis: $\frac{\pi}{2} \div 4 = \frac{\pi}{8}$

$\frac{\pi}{8}$; $\frac{\pi}{8} + \frac{\pi}{8} = \frac{2\pi}{8}$; $\frac{2\pi}{8} + \frac{\pi}{8} = \frac{3\pi}{8}$; $\frac{3\pi}{8} + \frac{\pi}{8} = \frac{4\pi}{8}$; $\frac{4\pi}{8} + \frac{\pi}{8} = \frac{5\pi}{8}$; $\frac{5\pi}{8} + \frac{\pi}{8} = \frac{6\pi}{8}$; $\frac{6\pi}{8} + \frac{\pi}{8} = \frac{7\pi}{8}$

Draw asymptotes where the cosine curve crosses the centerline. Mark maximum and minimum points on the cosine curve as points that are also on the graph of the secant curve.

Example: $y = 2\csc\left(4x - \frac{\pi}{2}\right)$

$y = 2\csc 4\left(x - \frac{\pi}{8}\right)$

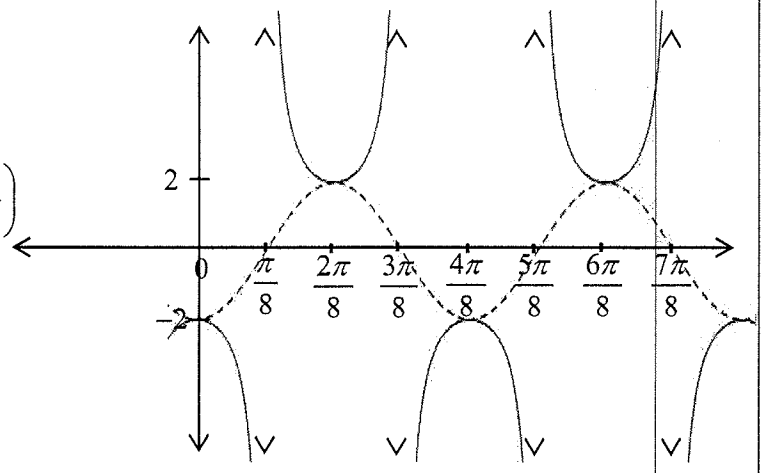
Reciprocal of $y = 2\sin 4\left(x - \frac{\pi}{8}\right)$

Amplitude = 2

period = $\frac{2\pi}{4} \rightarrow \frac{\pi}{2}$

vertical translation = none

phase shift = $\frac{\pi}{8}$ to the right



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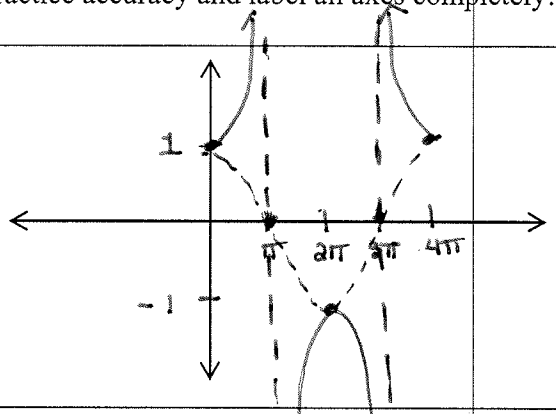
Draw asymptotes where the sine curve crosses the centerline. Mark maximum and minimum points on the sine curve as points that are also on the graph of the cosecant curve.

Graph each function over a two-period interval. Practice accuracy and label all axes completely!

1. $y = \sec\frac{x}{2}$

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

Period $\frac{2\pi}{1/2} = 4\pi$

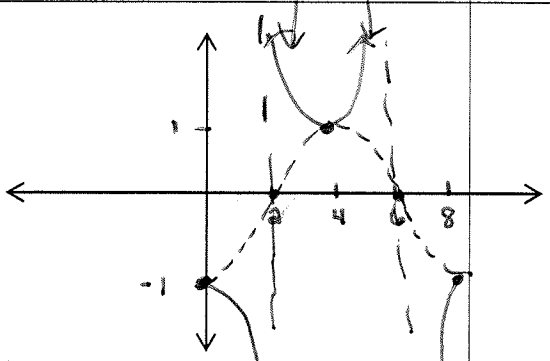


2. $y = -\sec\left(\frac{\pi x}{4}\right)$

$f(x) = -\cos\left(\frac{\pi}{4}x\right)$

Reflects

Period $\frac{2\pi}{\pi/4} = 8$

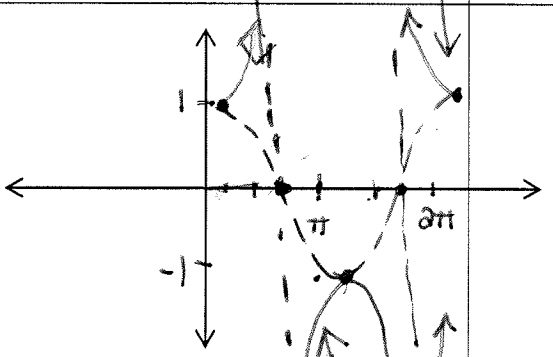


3. $y = \sec\left(x + \frac{\pi}{4}\right)$

$f(x) = \cos(x + \pi/4)$

amp 1

Rt $\pi/4$

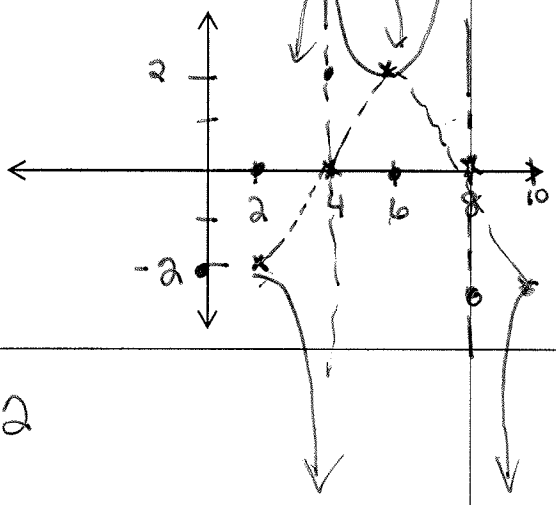


4. $y = -2\sec\left(\frac{\pi x}{4} - \frac{\pi}{2}\right)$

$F(x) = -2\cos\left(\frac{\pi}{4}x - \pi/2\right)$

Reflects

period $\frac{2\pi}{\pi/4} = 8$



P.S. 2Rt $\frac{\pi}{4}x = \pi/2$

$x = \frac{\pi}{2} \cdot \frac{4}{\pi}$ 2

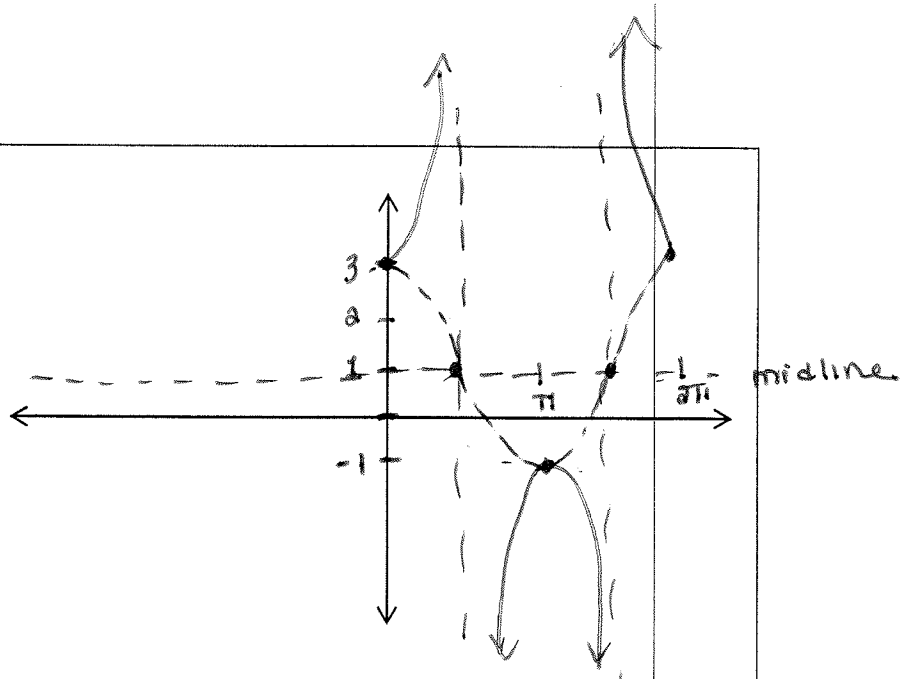
5. $y = 1 + 2\sec x$

$f(x) = 2\cos x + 1$

Amp 2

period 2π

up 1

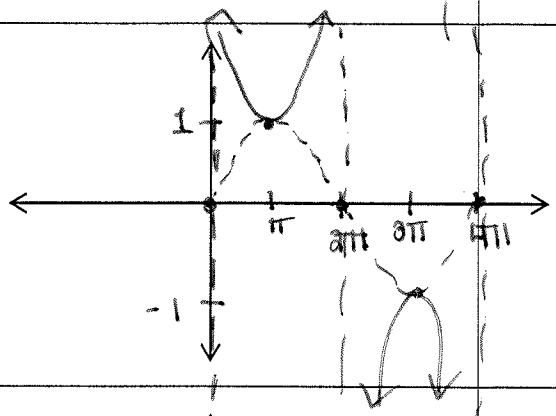


6. $y = -\csc\left(\frac{x}{2}\right)$

$f(x) = -\sin\left(\frac{1}{2}x\right)$

Reflects

Period $\frac{2\pi}{1/2} = 4\pi$

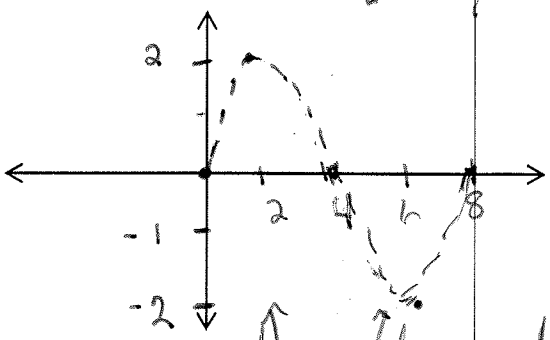


7. $y = 2\csc\frac{\pi x}{4}$

$f(x) = 2\sin\frac{\pi}{4}x$

Amp 2

period $\frac{2\pi}{\frac{\pi}{4}} = 8$



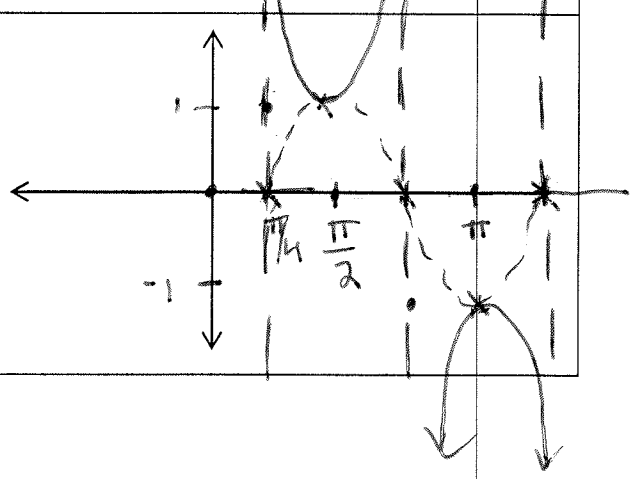
8. $y = \csc\left(2x - \frac{\pi}{2}\right)$

$f(x) = \sin 2(x - \pi/4)$

Amp 1

period π

$\pi/4$ RT

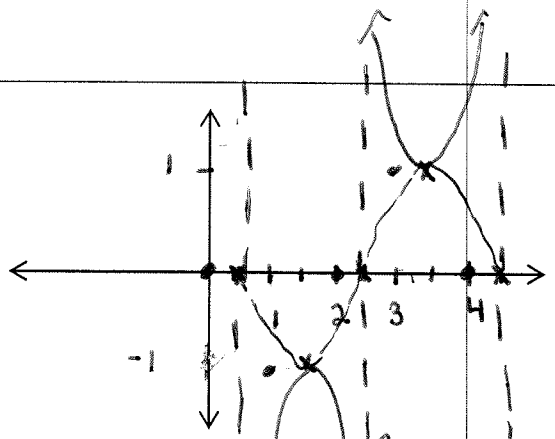


9. $y = -\csc\left(\frac{\pi x}{2} - \frac{\pi}{4}\right)$

$f(x) = -\sin \pi/2 (x - \frac{1}{2})$

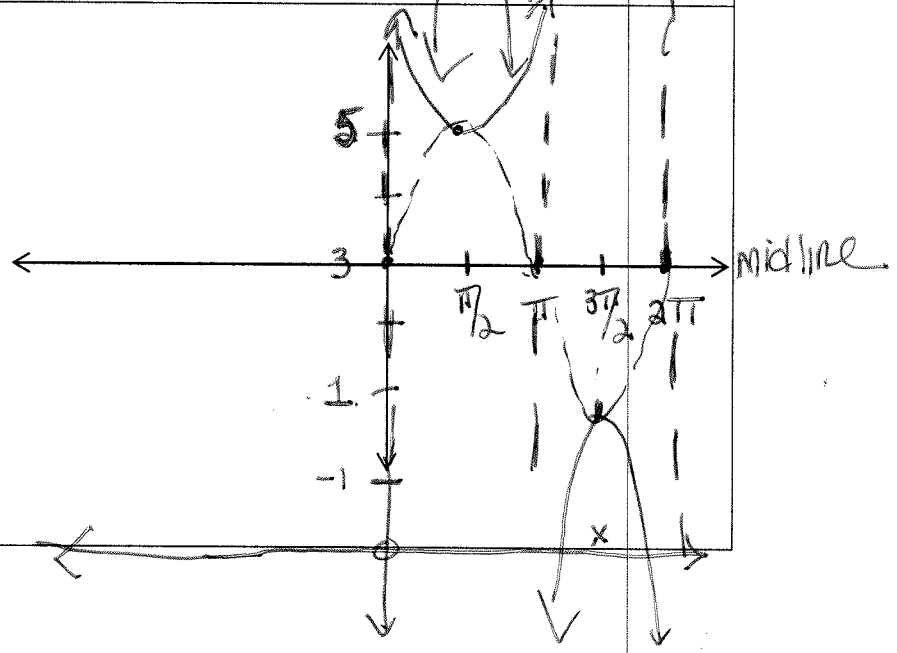
Reflects period $2\pi/\pi/2 = 4$

Amp 1 Rt 1/2



10. $y = 3 + 2\csc x$

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



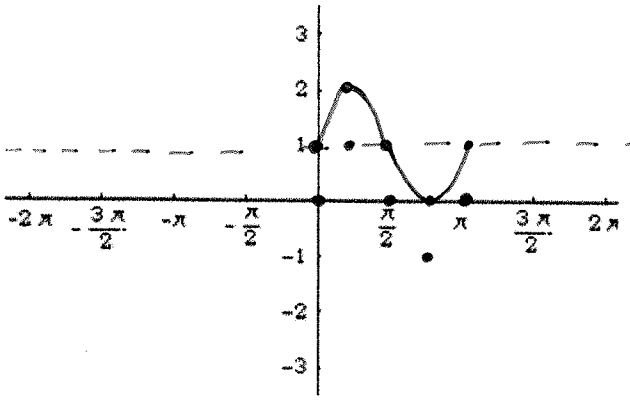
Pre Calculus Honors
GRAPHING TRIGONOMETRIC FUNCTIONS

Name Key

EXERCISE 1: **STATE THE AMPLITUDE, PERIOD, & GRAPH THE FUNCTION.**

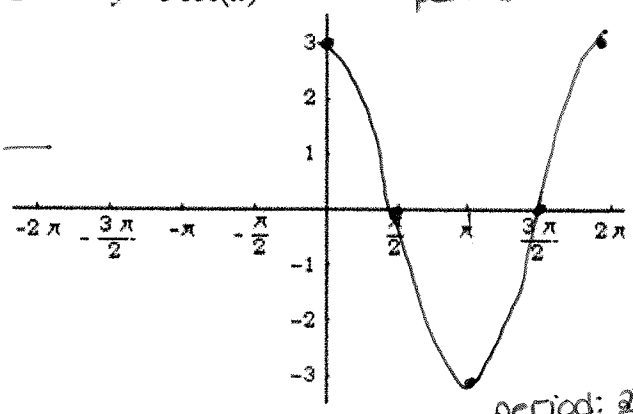
1. $y = \sin(2x) + 1$

amp: 1 per: $\frac{2\pi}{2} = \pi$ up 1



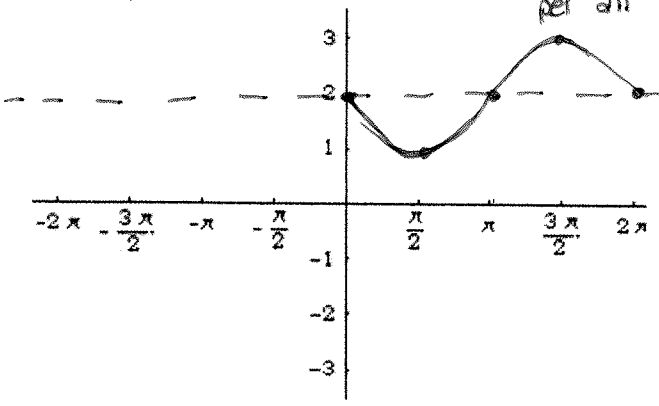
2. $y = 3\cos(x)$

amp: 3
per: 2π



3. $y = 2 - \sin x$

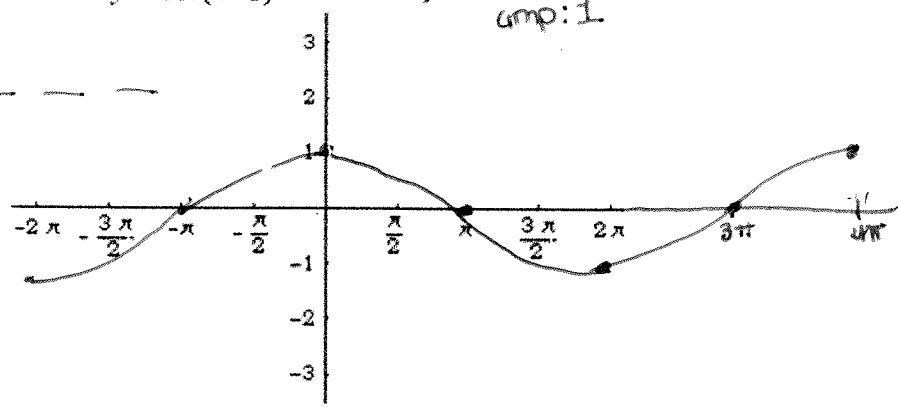
$y = -\sin x + 2$ reflect amp 1 up 2 per 2π



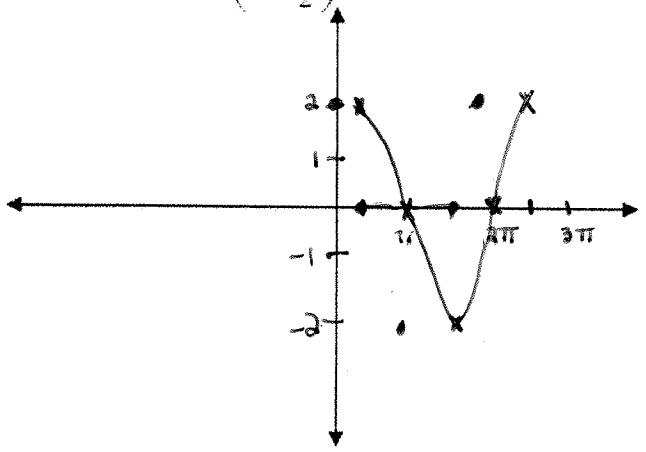
4. $y = \cos(x/2) = \cos\left(\frac{1}{2}x\right)$

period: $\frac{2\pi}{\frac{1}{2}} = 4\pi$

amp: 1



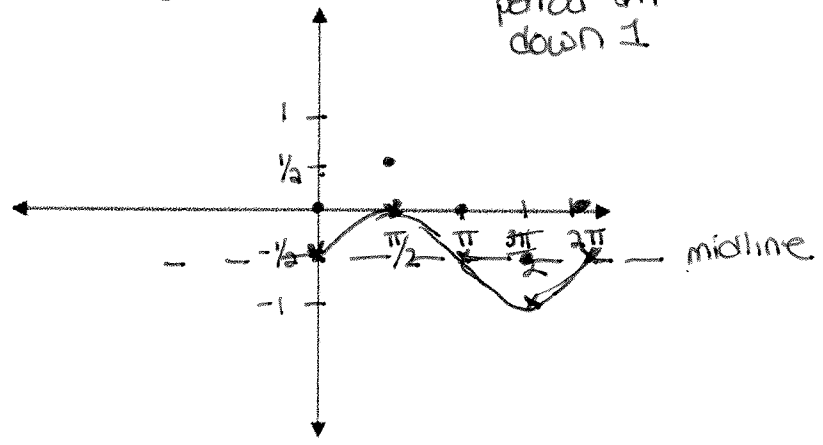
5. $y = 2\cos\left(x - \frac{\pi}{2}\right)$



amp 2
period 4π
RT $\pi/2$

6. $y = \frac{1}{2}\sin x - 1$

amp 1/2
period 2π
down 1



EXERCISE 2:

Let $f(x)=3\sin\left(2\left(x-\frac{\pi}{3}\right)\right)$. Find each of the following and sketch the graph.

a. Amplitude 3

b. Period π

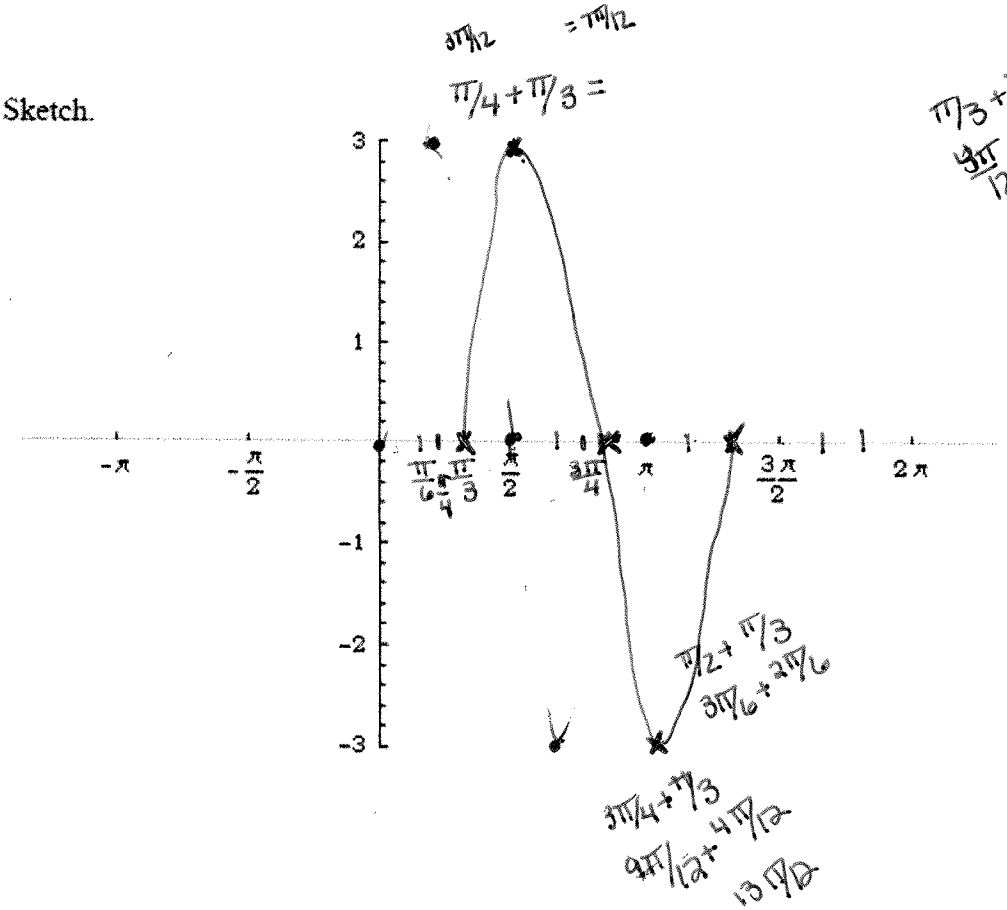
c. Phase shift $\pi/3$ rt

d. Zeros $\left(\pi/3+\frac{\pi n}{2},0\right)$ $n\in\mathbb{Z}$

e. Maximum points (both coordinates) $(7\pi/12,3)$

f. Minimum points $(13\pi/12,-3)$

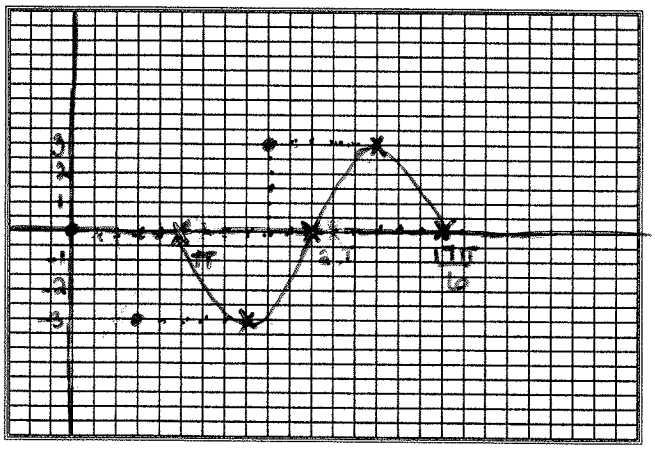
g. Sketch.



Graph each of the following:

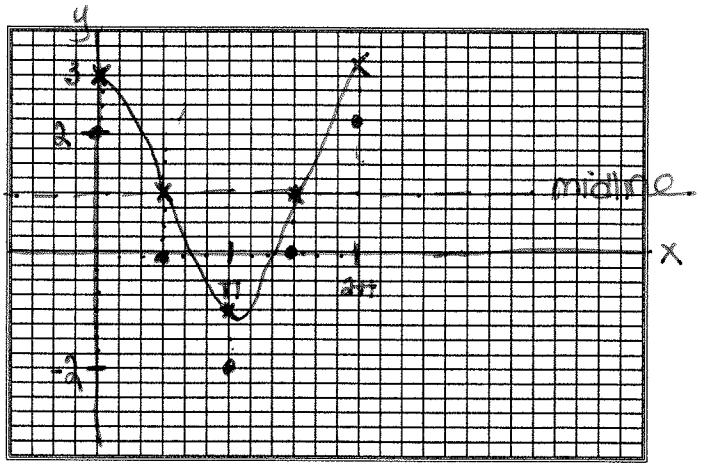
1) $f(x) = -3\sin\left(x - \frac{5\pi}{6}\right)$

Reflect period 2π
Amp: 3
Rt $5\pi/6$



$2\pi + \frac{5\pi}{6} = \frac{17\pi}{6}$

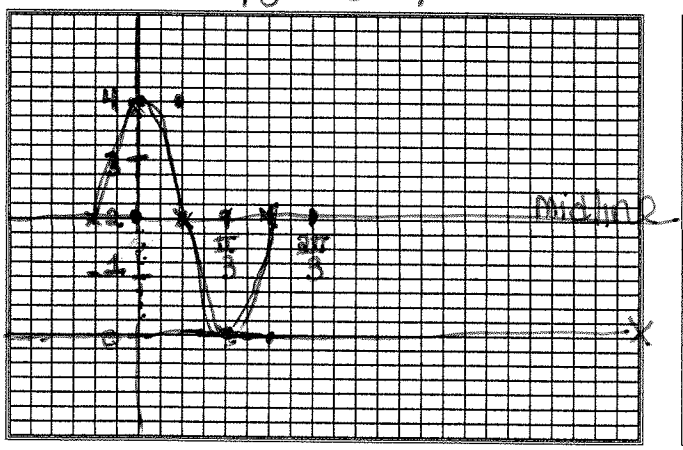
2) $f(x) = 2\cos(x)+1$



3) $f(x) = 2\sin\left(3x + \frac{\pi}{2}\right) + 2$

$3x + \pi/2 = 0$
$3x = -\pi/2$
$x = -\pi/6$

amp: 2 ps. left $\pi/6$
period: $2\pi/3$ V.S. up 2

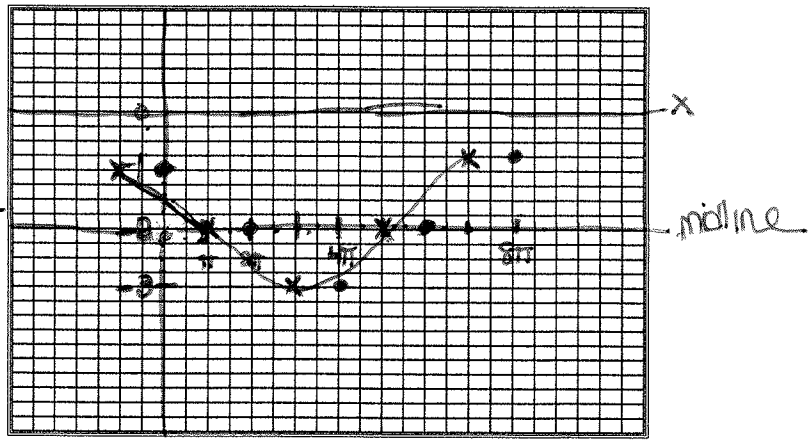


$\pi/6$ is 2 boxes

4) $f(x) = -\cos\left(\frac{x}{4} + \frac{\pi}{4}\right) - 2$

$-\cos\frac{1}{4}(x+\pi) - 2$

reflect
period $2\pi/\frac{1}{4} = 8\pi$
Left π amp 1
down 2



EXERCISE 3:

Let $g(x)=2\cos\left(\frac{1}{2}\left(x+\frac{\pi}{4}\right)\right)+1$. Find each of the following and sketch the graph.

a. Amplitude 2

b. Period $\frac{2\pi}{\frac{1}{2}}=4\pi$

c. Phase shift left $\pi/4$ up 1.

d. Maximum points $(-\pi/4+4\pi n, 3)$ $n\in\mathbb{Z}$. Minimum points $\left(\frac{7\pi}{4}+4\pi n, -1\right)$ $n\in\mathbb{Z}$

↑ period

f. Sketch the graph over at least one full period. Mark the scale carefully.