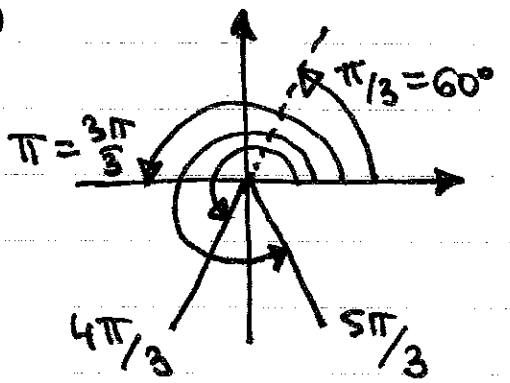
LS

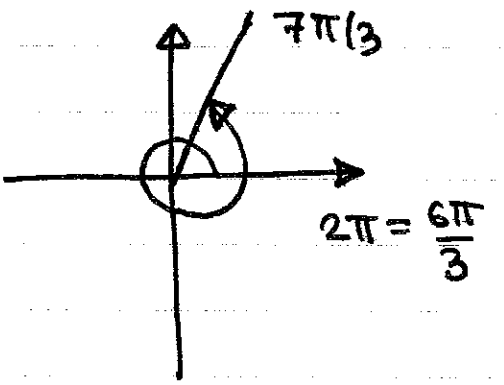
ASSIGNMENT 4

1.(a) $210° = 210 \cdot \frac{\pi}{180} = \frac{7\pi}{6}$ rad

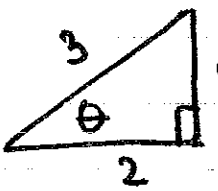
(b) $-\frac{9\pi}{2}$ rad $= -\frac{9\pi}{2} \cdot \frac{180}{\pi} = -810°$

(c)





(d)



$\sqrt{9-4} = \sqrt{5}$

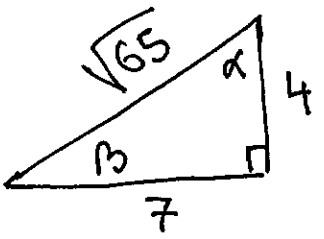
$\cos\theta = \frac{2}{3} \rightarrow \sec\theta = \frac{3}{2}$

$\sin\theta = \frac{\sqrt{5}}{3} \rightarrow \csc\theta = \frac{3}{\sqrt{5}}$

$\tan\theta = \frac{\sqrt{5}}{2} \rightarrow \cot\theta = \frac{2}{\sqrt{5}}$

2.

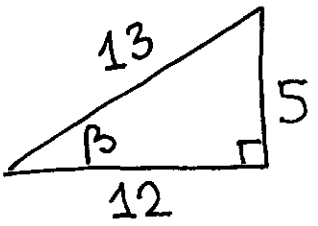
(a)



$\sin\alpha = \cos\beta = 7/\sqrt{65}$

$\cos\alpha = \sin\beta = 4/\sqrt{65}$

(b)



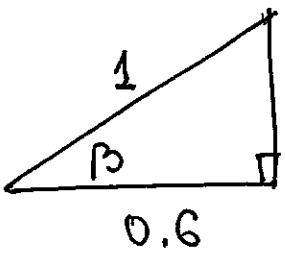
$\cos\beta = \frac{12}{13}$ → adjacent side is 12

→ opposite side is 5

$(\sqrt{13^2-12^2} = \sqrt{169-144} = 5)$

so $a=12$, $b=5$, $\sin\beta = 5/13$, $\tan\beta = 5/12$

(c)



$0.8 = \sqrt{1^2-0.6^2} = \sqrt{1-0.36} = \sqrt{0.64}$

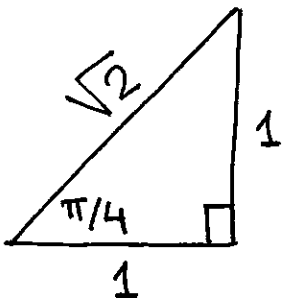
$\cos\beta = \frac{0.6}{1} = 0.6 \rightarrow \sec\beta = \frac{1}{0.6} = \frac{10}{6} = \frac{5}{3}$

$\sin\beta = \frac{0.8}{1} = 0.8 \rightarrow \csc\beta = \frac{1}{0.8} = \frac{10}{8} = \frac{5}{4}$

$\tan\beta = 0.8/0.6 = 4/3 \rightarrow \cot\beta = 3/4$

3.

(a)

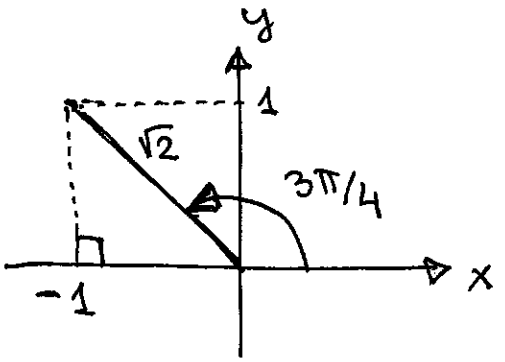


$$\sin\frac{\pi}{4} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$\cos\frac{\pi}{4} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$\tan\frac{\pi}{4} = 1$$

(b)

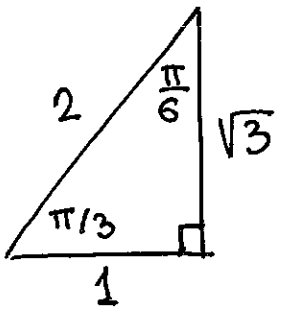


$$\sin\frac{3\pi}{4} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$\cos\frac{3\pi}{4} = \frac{-1}{\sqrt{2}} = -\frac{\sqrt{2}}{2}$$

$$\tan\frac{3\pi}{4} = {}^{1}/_{-1} = -1$$

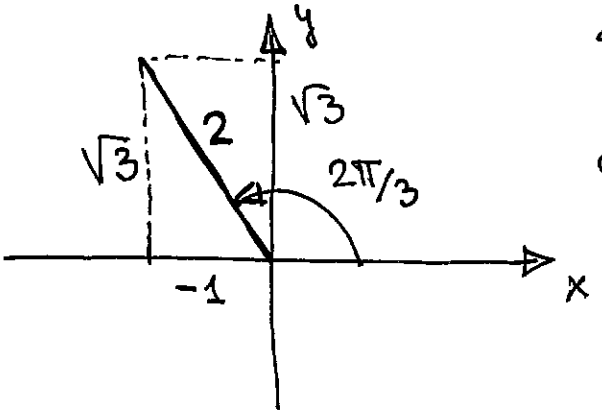
(c)



$$\sin\frac{\pi}{3} = \frac{\sqrt{3}}{2} \qquad \cos\frac{\pi}{3} = \frac{1}{2}$$

$$\tan\frac{\pi}{3} = \sqrt{3}$$

(d)



$$\sin\frac{2\pi}{3} = \frac{\sqrt{3}}{2}$$

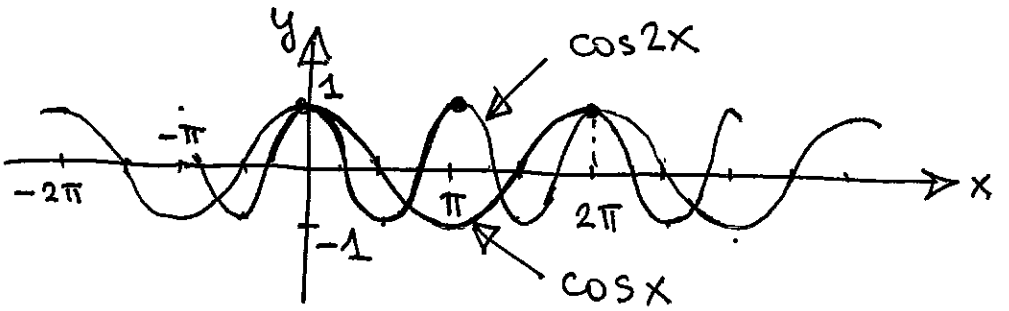
$$\cos\frac{2\pi}{3} = \frac{-1}{2}$$

$$\tan\frac{2\pi}{3} = -\sqrt{3}$$

4.

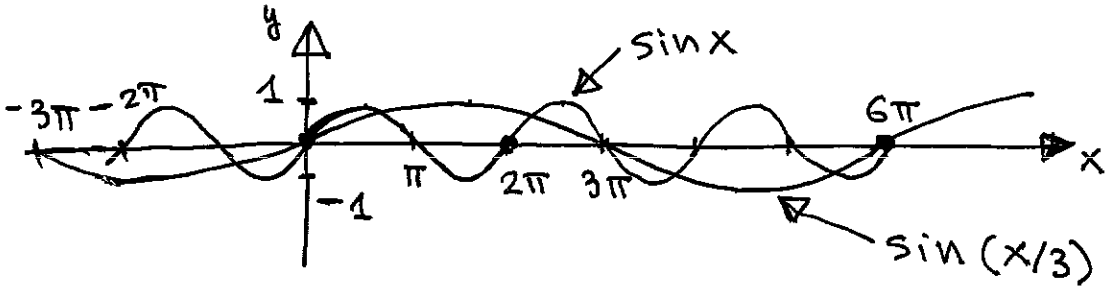
(a) $\cos x$ .... period 2π

$\cos 2x$ .... period $2\pi/2 = \pi$

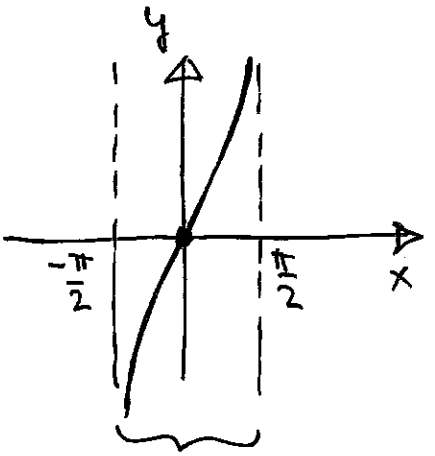


(b) $\sin x$ .... period 2π

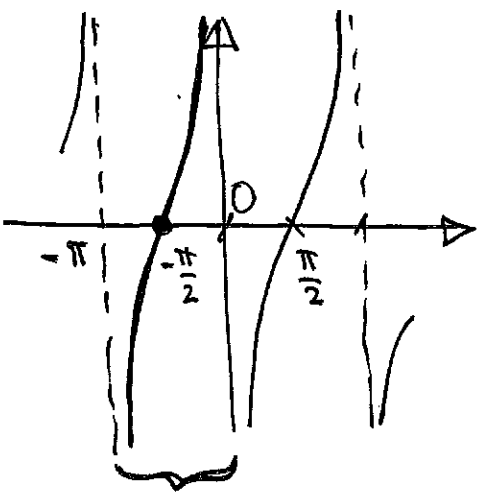
$\sin(x/3)$ ..... period $2\pi/1/3 = 6\pi$



(c)



shift $\pi/2$ units left



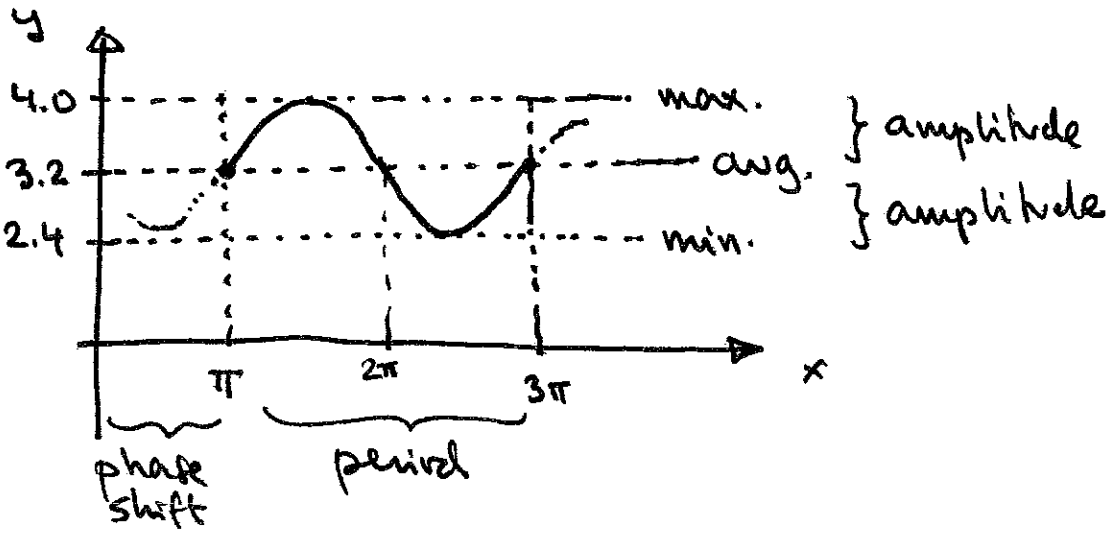
5.(a) $x \rightsquigarrow x - \pi$ ... period $= 2\pi$

phase shift $= \pi$ (right)

average $= 3.2$

amplitude $= 0.8$

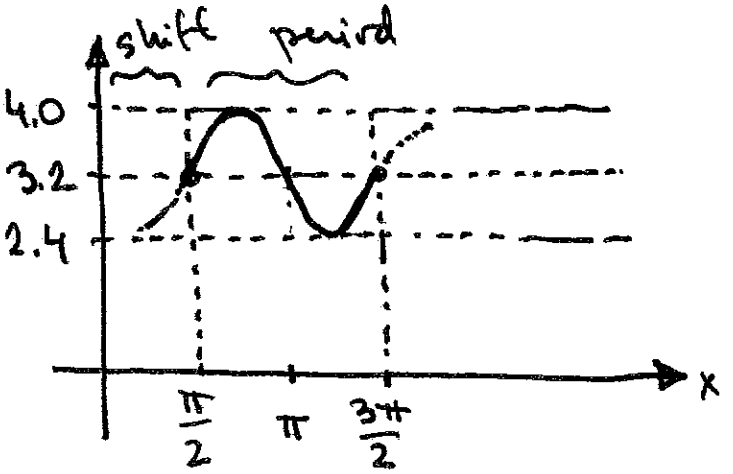
max $= 3.2 + 0.8 = 4$, min $= 3.2 - 0.8 = 2.4$



(b) $f(x) = 3.2 + 0.8 \sin\left(2\left(x - \frac{\pi}{2}\right)\right)$ ... period $= \frac{2\pi}{2} = \pi$

shift $\frac{\pi}{2}$ (right)

average, amplitude, min, max as in (a)



6.

(a) $\sin x = 1 \rightarrow x = \frac{\pi}{2}$

(only solution in $0 \leq x \leq 2\pi$)

(b) $x = \frac{\pi}{2} + 2\pi k$ (k = integer)

(c) $\cos x = 0 \rightarrow x = \frac{\pi}{2}, \frac{3\pi}{2}$

(d) $x = \frac{\pi}{2} + 2\pi k$ and $x = \frac{3\pi}{2} + 2\pi k$

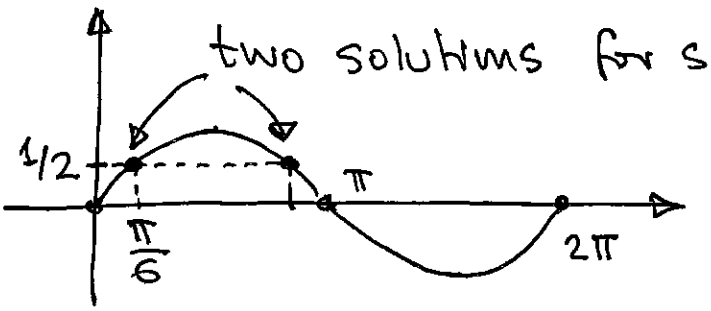
simplify:

$x = \frac{\pi}{2}, \frac{5\pi}{2}, \frac{9\pi}{2}, \ldots \quad -\frac{3\pi}{2}, -\frac{7\pi}{2}, \ldots$

$x = \frac{3\pi}{2}, \frac{7\pi}{2}, \ldots \quad -\frac{\pi}{2}, -\frac{5\pi}{2}, \ldots$

$\rightarrow x = \frac{\pi}{2} + \pi k$

7.(a)



we know from tables that $\sin \frac{\pi}{6} = \frac{1}{2}$

the other solution is $\pi - \frac{\pi}{6} = \frac{5\pi}{6}$

(b) $x = \frac{\pi}{6} + 2\pi k$ and $x = \frac{5\pi}{6} + 2\pi k$

(c) main period: $x = \pi$; all: $x = \pi + 2\pi k$

(d) main period: $x = \frac{\pi}{4}$; all: $x = \frac{\pi}{4} + \pi k$

8.(a) $\sin\left(\frac{\pi}{2}\right) = 1 \rightarrow \arcsin 1 = \pi/2$

(b) $\arcsin(\sin 0) = \arcsin(0) = 0$

$\arcsin(\sin\pi) = \arcsin(0) = 0$

clearly, it is not always true that $\arcsin(\sin x) = x$

(c) $\arccos 1 = 0$; $\arctan 1 = \pi/4$

(d) $\arcsin(-1) = -\frac{\pi}{2}$

$\arctan(-1) = -\frac{\pi}{4}$

(e) $\arcsin(2) = x$ means $\sin x = 2$

but $\sin x$ cannot be larger than 1!

$(-1 \leq \sin x \leq 1)$

END