Méchants bons problèmes : LES FONCTIONS TRIGONOMÉTRIQUES

#1 a) $\sin X = \frac{x}{z}$ b) $\cos Y = \frac{x}{z}$ c) $\tan X = \frac{x}{y}$ d) $\csc Y = \frac{1}{\sin Y} = \frac{1}{\frac{y}{z}} = \frac{z}{y}$

e) $\sec X = \frac{1}{\cos X} = \frac{1}{\frac{y}{z}} = \frac{z}{y}$ f) $\cot Y = \frac{1}{\tan Y} = \frac{1}{\frac{y}{x}} = \frac{x}{y}$

#2 a) $45° = \frac{\pi}{4}$ rad, $90° = \frac{\pi}{2}$ rad, $\frac{3\pi}{4}$ rad $= 135°$, π rad $= 180°$, $225° = \frac{5\pi}{4}$ rad

$270° = \frac{3\pi}{2}$ rad, $\frac{7\pi}{4}$ rad $= 315°$

b) $30° = \frac{\pi}{6}$ rad, $\frac{\pi}{3}$ rad $= 60°$, $120° = \frac{2\pi}{3}$ rad, $\frac{5\pi}{6}$ rad $= 150°$, $\frac{7\pi}{6}$ rad $= 210°$, $240° = \frac{4\pi}{3}$ rad

$300° = \frac{5\pi}{3}$ rad, $\frac{11\pi}{6}$ rad $= 330°$

#3 a) $\left.\begin{array}{l} 350° = x \text{ rad} \\ 180° = \pi \text{ rad} \end{array}\right\} \frac{350\pi}{180} = \underline{\frac{35\pi}{18} \text{ rad}}$ b) $\left.\begin{array}{l} 140° = x \text{ rad} \\ 180 = \pi \text{ rad} \end{array}\right\} \frac{140\pi}{180} = \underline{\frac{7\pi}{9} \text{ rad}}$

c) $70° = \underline{\frac{7\pi}{18} \text{ rad}}$ car $70° = \frac{1}{2}$ de $140° = \frac{7\pi}{9}$ rad d) $\left.\begin{array}{l} -110° = x \text{ rad} \\ 180° = \pi \text{ rad} \end{array}\right\} \frac{-110\pi}{180} = \underline{\frac{-11\pi}{18} \text{ rad}}$

#4 a) $\frac{\pi}{6}$ rad $= \underline{30°}$ b) $\frac{5\pi}{12}$ rad $= \frac{5 \times 180}{12} = \underline{75°}$ c) -3π rad $= -3 \times 180 = -540°$

d) 7 rad $= 7 \times 57{,}3°$ ou $\left.\begin{array}{l} 7 \text{ rad} = x° \\ \pi \text{ rad} = 180° \end{array}\right\} \frac{7 \times 180}{\pi} = \underline{401{,}07°}$ e) $0{,}75$ rad $= \frac{0{,}75 \times 180}{\pi} = \underline{42{,}97°}$

#5 a) $P\left(\frac{4\pi}{3}\right)$ $\frac{4\pi}{3}$ rad $= 240°$ donc III b) $P\left(\frac{7\pi}{3}\right)$ $\frac{7\pi}{3}$ rad $= 7 \times 60° = 420°$ donc $1{,}1\overline{6}$ tours I

c) $P(-23)$ $\left.\begin{array}{l} -23 \text{ rad} = x \text{ tours} \\ 2\pi \text{ rad} = 1 \text{ tour} \end{array}\right\} x = \frac{-23}{2\pi} = -3{,}66$ tours donc II

d) $P(90)$ $\frac{90}{2\pi} = 14{,}32$ tours donc II

#6 a) $P(0) = (1,0)$ b) $P(-\frac{\pi}{2}) = (0,-1)$ c) $P(\pi) = (-1,0)$ d) $P(-2\pi) = (1,0)$

e) $P(-\frac{3\pi}{2}) = (0,1)$ f) $P(\frac{29\pi}{6}) = P(-\frac{\sqrt{3}}{2}, \frac{1}{2})$ g) $P(\frac{27\pi}{4}) = (-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$

↳ $\frac{29\pi}{6} - 2\left(\frac{12\pi}{6}\right) = \boxed{\frac{5\pi}{6}}$

↳ 2π rad = 1 tour

↳ $\frac{27\pi}{4} - 3\left(\frac{8\pi}{4}\right) = \boxed{\frac{3\pi}{4}}$

↳ 2π rad = 1 tour

h) $P(-\frac{11\pi}{6}) = P(\frac{\pi}{6}) = (\frac{\sqrt{3}}{2}, \frac{1}{2})$ i) $P(\frac{25\pi}{2}) = (0,1)$

↳ $\frac{25\pi}{2} - 6\left(\frac{2\pi}{2}\right) = \boxed{\frac{\pi}{2}}$

↳ 2π rad = 1 tour.

#7 a) $\sin\frac{\pi}{3} = \boxed{\frac{\sqrt{3}}{2}}$ b) $\sin\frac{5\pi}{6} = \boxed{\frac{1}{2}}$ c) $\cos\frac{\pi}{4} = \boxed{\frac{\sqrt{2}}{2}}$ d) $\cos\frac{7\pi}{6} = \boxed{-\frac{\sqrt{3}}{2}}$

e) $\tan -\frac{\pi}{3} = \dfrac{\sin -\frac{\pi}{3}}{\cos -\frac{\pi}{3}} = \dfrac{-\frac{\sqrt{3}}{2}}{\frac{1}{2}} = -\frac{\sqrt{3}}{2} \times \frac{2}{1} = \boxed{-\sqrt{3}}$

f) $\cot\frac{4\pi}{3} = \dfrac{\cos\frac{4\pi}{3}}{\sin\frac{4\pi}{3}} = \dfrac{-\frac{1}{2}}{-\frac{\sqrt{3}}{2}} = -\frac{1}{2} \times \frac{-2}{\sqrt{3}} = \boxed{\frac{1}{\sqrt{3}}}$ ou $\frac{1}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \boxed{\frac{\sqrt{3}}{3}}$

g) $\csc\frac{3\pi}{4} = \dfrac{1}{\sin\frac{3\pi}{4}} = \dfrac{1}{\frac{\sqrt{2}}{2}} = \boxed{\frac{2}{\sqrt{2}}}$ ou $\frac{2}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{2}}{2} = \boxed{\sqrt{2}}$

h) $\sec 3\pi = \dfrac{1}{\cos 3\pi} = \dfrac{1}{-1} = \boxed{-1}$

#8 $m\widehat{AB} = \frac{\pi}{5} \times 10 = \underline{2\pi\text{ cm}}$ ou $\underline{6{,}28\text{cm}}$

$m\widehat{CD} = \frac{\pi}{5} \times 12{,}5 = \underline{7{,}85\text{ cm}}$

$m\widehat{EF} = \frac{\pi}{5} \times 16{,}7 = \underline{10{,}49\text{ cm}}$

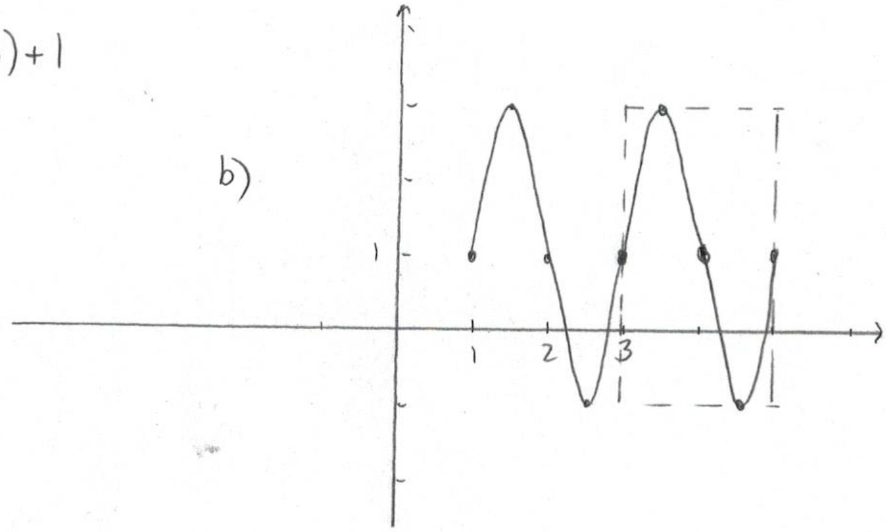
#9 amplitude = 3 periode = 4

#10 $f(x) = 2\sin\pi(x-3)+1$

a) $\boxed{\begin{array}{l} \text{ampl.} = 2 \\ p = \frac{2\pi}{\pi} = 2 \end{array}}$

$(h,k) = (3,1)$

allure 

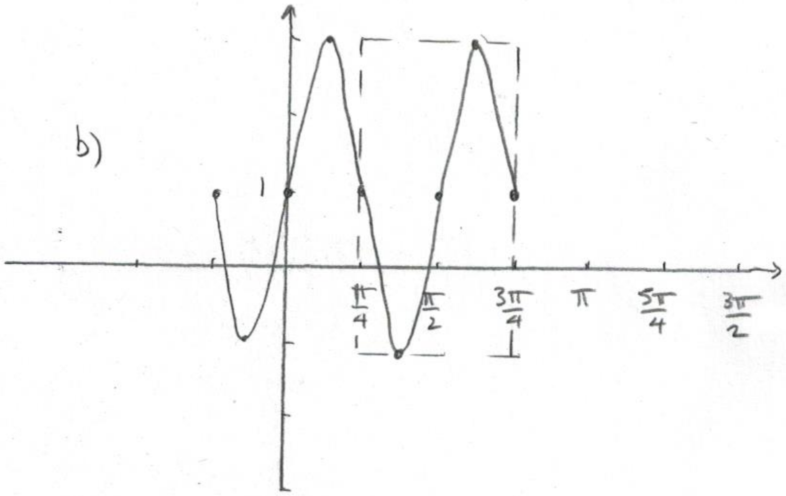
b) 

$g(x) = -2\sin 4\left(x - \frac{\pi}{4}\right) + 1$

a) $\boxed{\begin{array}{l} \text{ampl.} = 2 \\ p = \frac{2\pi}{4} = \frac{\pi}{2} \end{array}}$

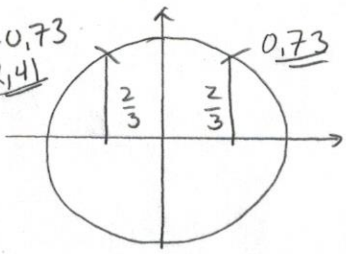
$(h,k) = \left(\frac{\pi}{4}, 1\right)$

allure 

b) 

#11 a) $0 = -3\sin x + 2$

$\frac{2}{3} = \sin x$



$\sin^{-1}\left(\frac{2}{3}\right) = 0{,}73\text{rad}$

$\boxed{\begin{array}{l} x = 0{,}73 + 2\pi n \\ x = 2{,}41 + 2\pi n \end{array}}$ $n \in \mathbb{Z}$

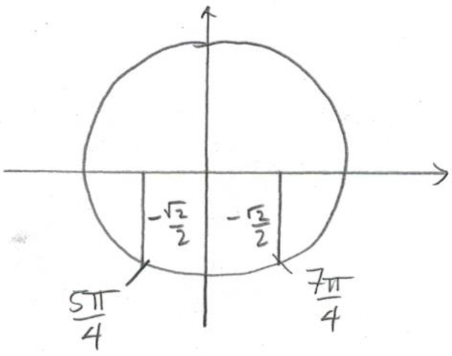
b) $0 = -\sin x + 3{,}5$

$3{,}5 = \sin x$

$\boxed{\emptyset}$ car $-1 \leq \sin x \leq 1$

11c) $0 = 2\sin 2(x-\pi) + \sqrt{2}$

$-\frac{\sqrt{2}}{2} = \sin 2(x-\pi)$



$p = \frac{2\pi}{2} = \pi$

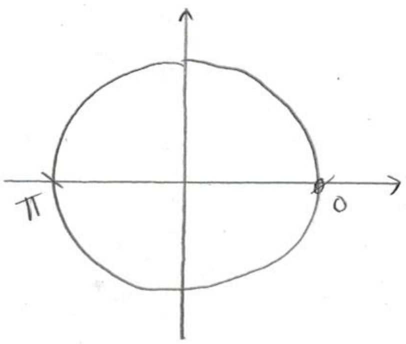
$2(x-\pi) = \frac{5\pi}{4} \Rightarrow x - \pi \overset{+\pi}{=} \frac{5\pi}{8}^{+\pi} \Rightarrow \boxed{x = \frac{13\pi}{8} + \pi n}$

$2(x-\pi) = \frac{7\pi}{4} \Rightarrow x - \pi \overset{+\pi}{=} \frac{7\pi}{8}^{+\pi} \Rightarrow \boxed{x = \frac{15\pi}{8} + \pi n}$

$\underline{n \in \mathbb{Z}}$

d) $0 = -4\sin\frac{\pi}{4}(x+1)$

$0 = \sin\frac{\pi}{4}(x+1)$



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

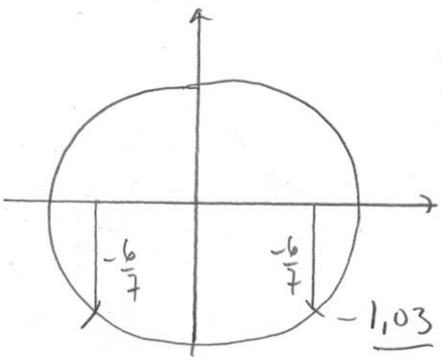
$\frac{\pi}{4}(x+1) = 0 \Rightarrow x+1 = 0 \Rightarrow \boxed{x = -1 + 8n}$

$\frac{\pi}{4}(x+1) = \pi \Rightarrow x+1 = 4 \Rightarrow \boxed{x = 3 + 8n}$

$\underline{n \in \mathbb{Z}}$

e) $0 = -7\sin(x-1) + 6$

$\frac{-6}{7} = \sin(x-1)$



$\pi - -1{,}03$
$= \underline{4{,}17}$

$\sin^{-1}\left(-\frac{6}{7}\right) = -1{,}03 \text{ rad}$

$p = \frac{2\pi}{1} = 2\pi$

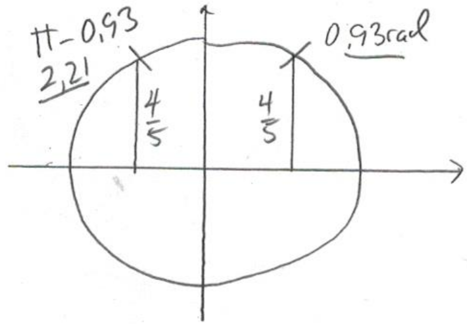
$x - 1 = -1{,}03 \Rightarrow \boxed{x = -0{,}03 + 2\pi n}$

$x - 1 = 4{,}17 \Rightarrow \boxed{x = 5{,}17 + 2\pi n}$

$\underline{n \in \mathbb{Z}}$

#11 f) $0 = -5\sin(2x-3)+4$

$\frac{4}{5} = \sin(2x-3)$



$\sin^{-1}\frac{4}{5} = 0{,}93\text{rad}$

$p = \frac{2\pi}{2} = \pi$

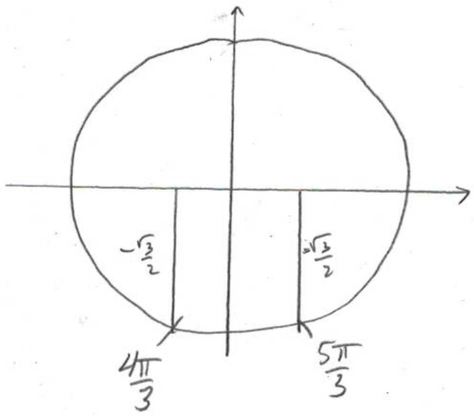
$2x-3 = 0{,}93 \Rightarrow \boxed{x = 1{,}97 + \pi n}$

$2x-3 = 2{,}21 \Rightarrow \boxed{x = 2{,}61 + \pi n}$

$n \in \mathbb{Z}$

g) $0 = 2\sin\frac{\pi}{2}(x-1) + \sqrt{3}$

$-\frac{\sqrt{3}}{2} = \sin\frac{\pi}{2}(x-1)$



$\frac{\pi}{2}(x-1) = \frac{4\pi}{3} \Rightarrow x-1 = \frac{4\pi}{3}\cdot\frac{2}{\pi} \Rightarrow x-1 \overset{+1}{=} \overset{+1}{\frac{8}{3}}$

$\frac{\pi}{2}(x-1) = \frac{5\pi}{3} \Rightarrow x-1 = \frac{5\pi}{3}\cdot\frac{2}{\pi} \Rightarrow x-1 \overset{+1}{=} \overset{+1}{\frac{10}{3}}$

$\boxed{x = \frac{11}{3} + 4n}$

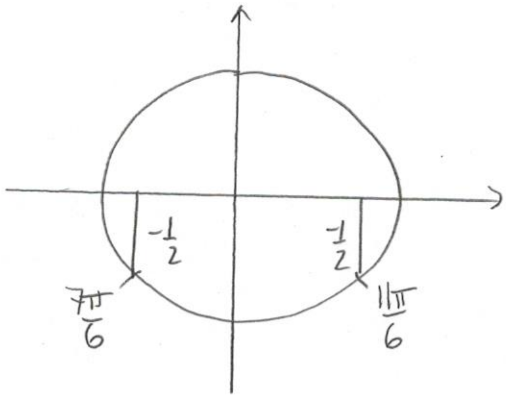
$\boxed{x = \frac{13}{3} + 4n}$

$n \in \mathbb{Z}$

$p = \frac{2\pi}{\frac{\pi}{2}} = 4$

h) $0 = 4\sin 2\left(x - \frac{\pi}{7}\right) + 2$

$-\frac{1}{2} = \sin 2\left(x - \frac{\pi}{7}\right)$



$2\left(x-\frac{\pi}{7}\right) = \frac{7\pi}{6} \Rightarrow x - \frac{\pi}{7} = \frac{7\pi}{12} \Rightarrow x = \frac{7\pi}{12} + \frac{\pi}{7}$

$2\left(x-\frac{\pi}{7}\right) = \frac{11\pi}{6} \Rightarrow x - \frac{\pi}{7} = \frac{11\pi}{12} \Rightarrow x = \frac{11\pi}{12} + \frac{\pi}{7}$

$x = \frac{49\pi}{84} + \frac{12\pi}{84} = \boxed{\frac{61\pi}{84} + \pi n}$

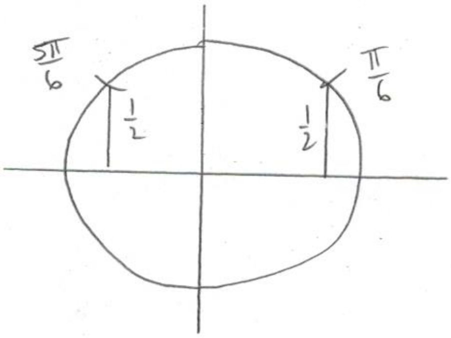
$x = \frac{77\pi}{84} + \frac{12\pi}{84} = \boxed{\frac{89\pi}{84} + \pi n}$

$n \in \mathbb{Z}$

$p = \frac{2\pi}{2} = \pi$

11i) $0 = 6\sin\left(\frac{\pi}{12}x - \frac{2\pi}{3}\right) - 3$

$$\frac{1}{2} = \sin\left(\frac{\pi}{12}x - \frac{2\pi}{3}\right)$$



$$\frac{\pi}{12}x - \frac{2\pi}{3} = \frac{\pi}{6} \Rightarrow \frac{\pi}{12}x = \frac{\pi}{6} + \frac{2\pi}{3}\cdot\frac{2}{2} \Rightarrow \frac{\pi}{12}x = \frac{5\pi}{6}$$

$$\frac{\pi}{12}x - \frac{2\pi}{3} = \frac{5\pi}{6} \Rightarrow \frac{\pi}{12}x = \frac{5\pi}{6} + \frac{2\pi}{3}\cdot\frac{2}{2} \Rightarrow \frac{\pi}{12}x = \frac{9\pi}{6}$$

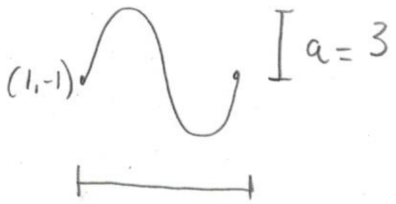
$$\frac{\pi}{12}x = \frac{5\pi}{6} \Rightarrow x = \frac{5\pi}{6}\cdot\frac{12}{\pi} \Rightarrow \boxed{x = 10 + 24n}$$

$$\frac{\pi}{12}x = \frac{9\pi}{6} \Rightarrow x = \frac{9\pi}{6}\cdot\frac{12}{\pi} \Rightarrow \boxed{x = 18 + 24n}$$

$n \in \mathbb{Z}$

$$p = \frac{2\pi}{\frac{\pi}{12}} = 24$$

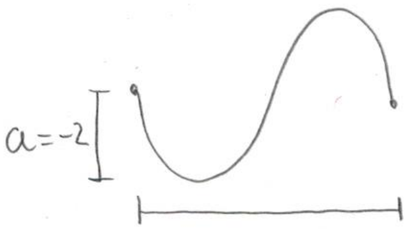
12 a) cycle partant de $(h,k) = (1,-1)$



$$\boxed{y = 3\sin\pi(x-1) - 1}$$

$p = 2$ donc $2 = \frac{2\pi}{b} \Rightarrow b = \pi$

b) cycle partant de $(0,1)$



$$\boxed{y = -2\sin 4x + 1}$$

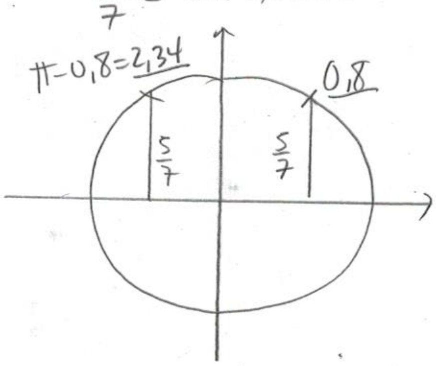
$p = \frac{\pi}{2}$ donc $\frac{\pi}{2} = \frac{2\pi}{b} \Rightarrow b = 4$

13 temps pour 1 tour complet = 1 période $= \frac{2\pi}{b} = \frac{2\pi}{15} = \boxed{0{,}41887902 \text{ sec.}}$

#14 $25 = 35 \sin 0{,}06\pi t$

$\frac{25}{35} = \sin 0{,}06\pi t$

$\frac{5}{7} = \sin 0{,}06\pi t$



$\sin^{-1}\frac{5}{7} = 0{,}80$

$0{,}06\pi t = 0{,}8 \Rightarrow t = 4{,}24 + 33{,}\overline{3}n$

$0{,}06\pi t = 2{,}34 \Rightarrow t = 12{,}41 + 33{,}\overline{3}n$ $\quad \underline{n \in \mathbb{Z}}$

$p = \frac{2\pi}{0{,}06\pi} = 33{,}\overline{3}$

a) $\boxed{t_1 = 4{,}24 \text{ millisecondes}}$

b) $\underbrace{4{,}24}_{1er}$, $\underbrace{37{,}57\overline{3}}_{3è}$, $\boxed{70{,}90\overline{6} \text{ 5è temps}}$ $\quad (+33{,}\overline{3})$

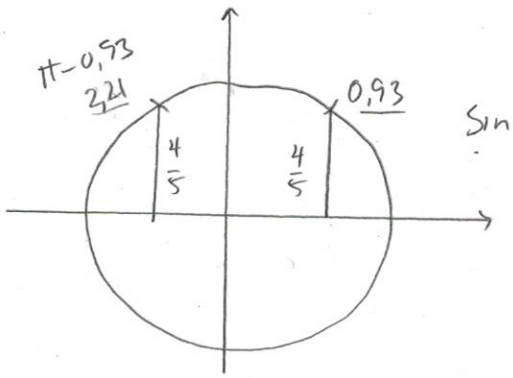
$\underbrace{12{,}41}_{2è}$, $\underbrace{45{,}74\overline{3}}_{4è}$

#15

$100 = 25 \sin \frac{\pi t}{12} + 80$

$20 = 25 \sin \frac{\pi t}{12}$

$\frac{4}{5} = \sin \frac{\pi}{12} t$



$\sin^{-1}\frac{4}{5} = 0{,}93$

$\frac{\pi}{12} t = 0{,}93 \Rightarrow t = 3{,}54 + 24n$

$\underline{n \in \mathbb{Z}}$

$\frac{\pi}{12} t = 2{,}21 \Rightarrow t = 8{,}46 + 24n$

$p = \frac{2\pi}{\frac{\pi}{12}} = 24$

rép: 3,54è mois $\xrightarrow{+24}$ 27,54è mois

8,46è mois $\quad$ 32,46è mois

#16 $f(x) = -2\cos \frac{\pi}{2}(x+1) + 3$

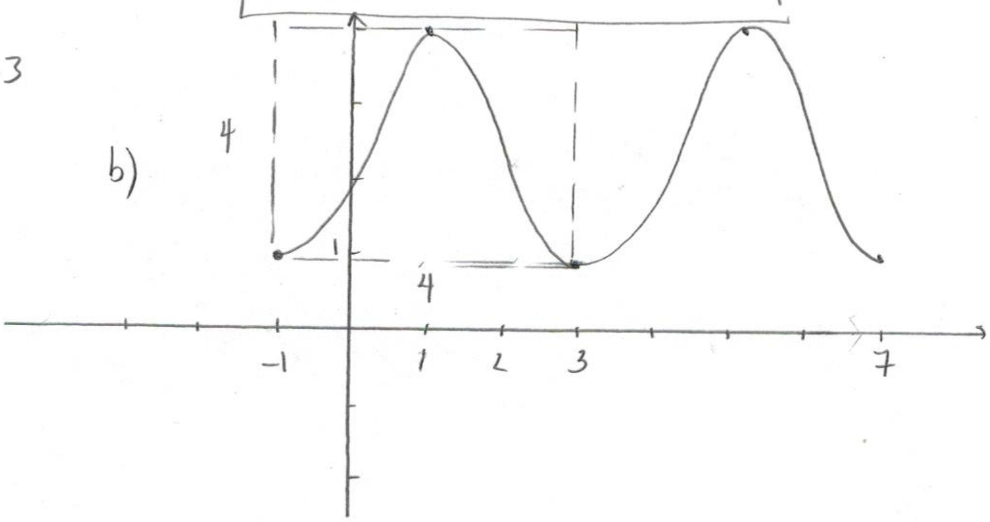
a) amplitude = 2

$p = \frac{2\pi}{\frac{\pi}{2}} = 4$

$(h, k+a) = (-1, 1)$

allure

b)



#16 suite $g(x) = 3\cos -\frac{1}{2}(x+\pi)+1$

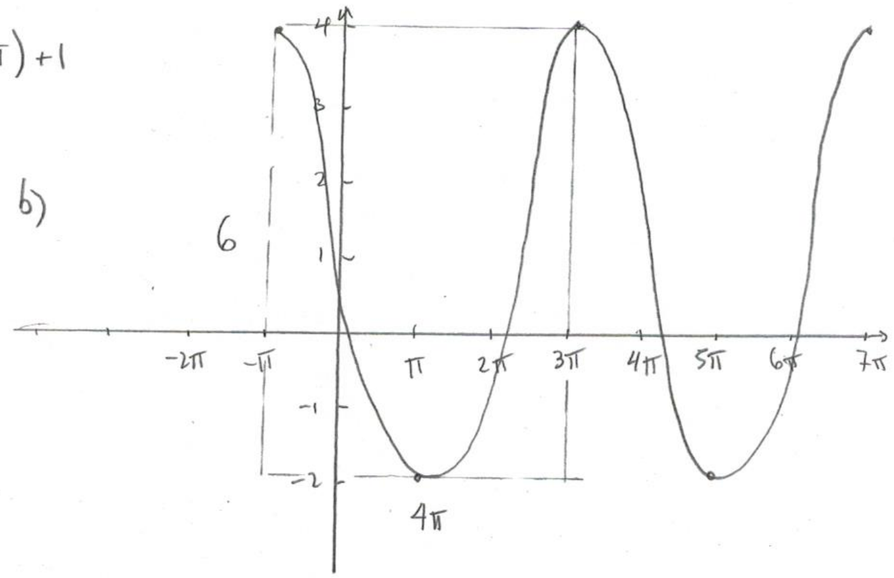
a) amplitude = 3

$p = \frac{2\pi}{\frac{1}{2}} = 4\pi$

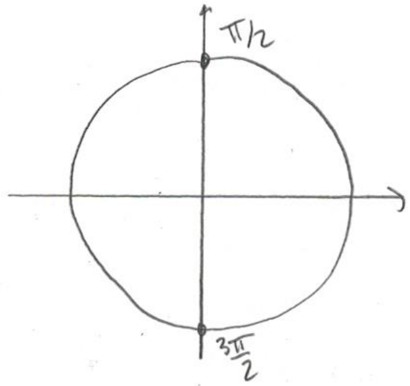
$(h, k+a) = (-\pi, 4)$

allure

b)



#17 a) $0 = \cos 3(x-\pi)$



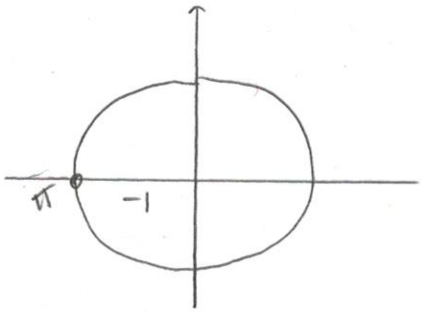
$3(x-\pi) = \frac{\pi}{2} \Rightarrow x-\pi = \frac{\pi}{6} \Rightarrow \boxed{x = \frac{7\pi}{6} + \frac{2\pi}{3}n}$ $n \in \mathbb{Z}$

$p = \frac{2\pi}{3}$

$3(x-\pi) = \frac{3\pi}{2} \Rightarrow x-\pi = \frac{3\pi}{6} \Rightarrow x = \frac{9\pi}{6} = \boxed{\frac{3\pi}{2} + \frac{2\pi}{3}n}$

b) $0 = \cos(x-1)+1$

$-1 = \cos(x-1)$



$x-1 = \pi$

$\boxed{x = 4{,}14 + 2\pi n}$ $n \in \mathbb{Z}$

$p = \frac{2\pi}{1} = 2\pi$

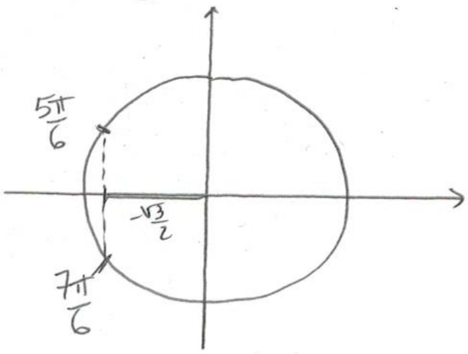
c) $0 = \cos x + 2$

$-2 = \cos x$

$\boxed{\emptyset}$ car $-1 \leq \cos x \leq 1$

#17d) $0 = 2\cos 2x + \sqrt{3}$

$-\frac{\sqrt{3}}{2} = \cos 2x$



$p = \frac{2\pi}{2} = \pi$

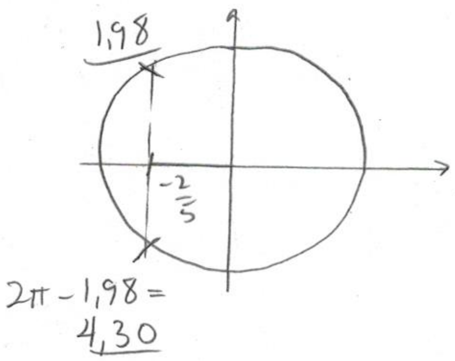
$2x = \frac{5\pi}{6} \Rightarrow x = \frac{5\pi}{12} + \pi n$

$2x = \frac{7\pi}{6} \Rightarrow x = \frac{7\pi}{12} + \pi n$

$n \in \mathbb{Z}$.

e) $0 = 5\cos(2x-5) + 2$

$\frac{-2}{5} = \cos(2x-5)$



$\cos^{-1}\left(-\frac{2}{5}\right) = 1{,}98$

$p = \frac{2\pi}{2} = \pi$

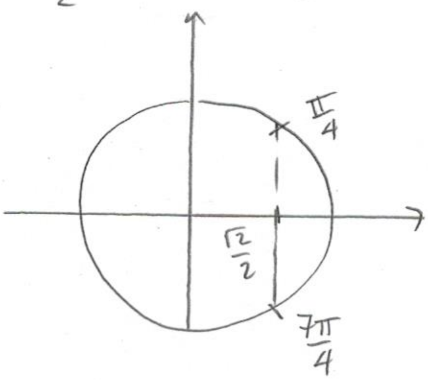
$2x - 5 = 1{,}98 \Rightarrow x = 3{,}49 + \pi n$

$2x - 5 = 4{,}30 \Rightarrow x = 4{,}65 + \pi n$

$n \in \mathbb{Z}$

f) $0 = 2\cos 2\left(x - \frac{\pi}{2}\right) - \sqrt{2}$

$\frac{\sqrt{2}}{2} = \cos 2\left(x - \frac{\pi}{2}\right)$



$p = \frac{2\pi}{2} = \pi$

$2\left(x - \frac{\pi}{2}\right) = \frac{\pi}{4} \Rightarrow x - \frac{\pi}{2} = \frac{\pi}{8} \Rightarrow x = \frac{5\pi}{8} + \pi n$

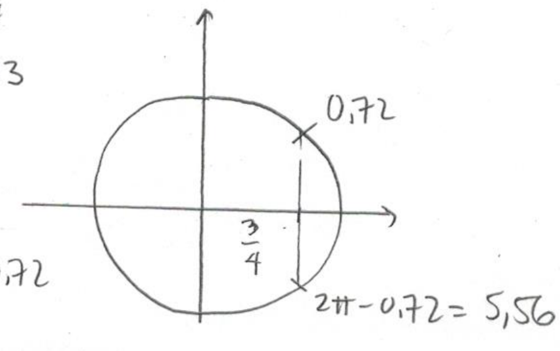
$2\left(x - \frac{\pi}{2}\right) = \frac{7\pi}{4} \Rightarrow x - \frac{\pi}{2} = \frac{7\pi}{8} \Rightarrow x = \frac{11\pi}{8} + \pi n$

$n \in \mathbb{Z}$

g) $0 = -4\cos(x-7) + 3$

$\frac{3}{4} = \cos(x-7)$

$\cos^{-1}(3/4) = 0{,}72$

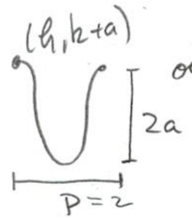


$x - 7 = 0{,}72 \Rightarrow x = 7{,}72 + 2\pi n$

$x - 7 = 5{,}56 \Rightarrow x = 12{,}72 + 2\pi n$

$n \in \mathbb{Z}$

$p = \frac{2\pi}{1}$

#18 cycle 

où $(h, k+a)$ est $(-0{,}5, 2)$

a)

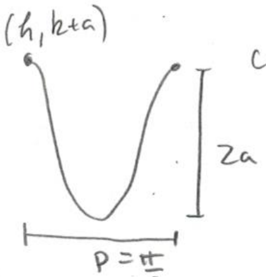
$h = -0{,}5$

$k = \text{milieu} = -1$

$a = \text{demi-hauteur} = 3$

$p = 2$ donc $p = 2 = \frac{2\pi}{b} \Rightarrow b = \pi$

$$\boxed{y = 3\cos \pi(x + 0{,}5) - 1}$$

b) cycle 

cycle avec $(h, k+a) = (0, 3)$

$h = 0$

$k = \text{milieu} = 1$

$a = \text{demi-hauteur} = 2$

$p = \frac{\pi}{2} = \frac{2\pi}{b} \Rightarrow b = 4$

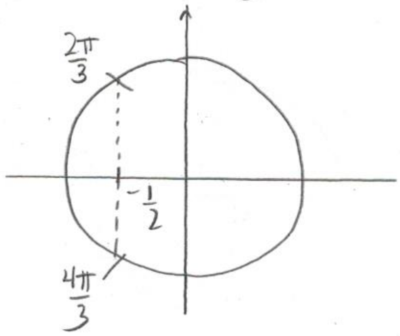
$$\boxed{y = 2\cos 4x + 1}$$

#19

$12 = -4\cos \frac{2\pi}{3}t + 10$

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

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



$p = \frac{2\pi}{\frac{2\pi}{3}} = 3$

$\frac{2\pi}{3}t = \frac{2\pi}{3} \Rightarrow t = 1 + 3n$

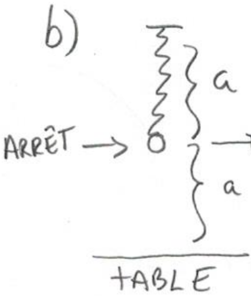
$n \in \mathbb{Z}$

$\frac{2\pi}{3}t = \frac{4\pi}{3} \Rightarrow t = 2 + 3n$

a) 1, 4, 7, 10, 13 sec

2, 5, 8, 11, 14 sec

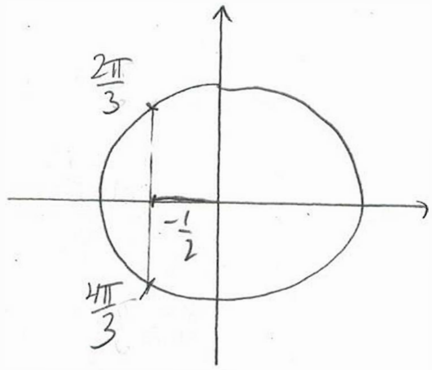
$\underbrace{\quad}_{+3}$

b) 

$\rightarrow$ $\underline{k = 10}$ = pt de repos donc 10 cm de la <u>table</u>

#20 $0 = 250 \cos \frac{\pi t}{15} + 125$

$-\frac{1}{2} = \cos \frac{\pi}{15} t$



$\frac{\pi}{15} t = \frac{2\pi}{3} \Rightarrow t = \frac{2\pi}{3} \cdot \frac{15}{\pi} \Rightarrow t = 10\,s$

$\frac{\pi}{15} t = \frac{4\pi}{3} \Rightarrow t = \frac{4\pi}{3} \cdot \frac{15}{\pi} \Rightarrow t = 20\,s$

$\boxed{10\text{ sec}}$

#21 $h(x) = 18 \cos \frac{2\pi}{15} x + 95$

Max $= k + a = 95 + 18 = \underline{113\text{ cm}}$

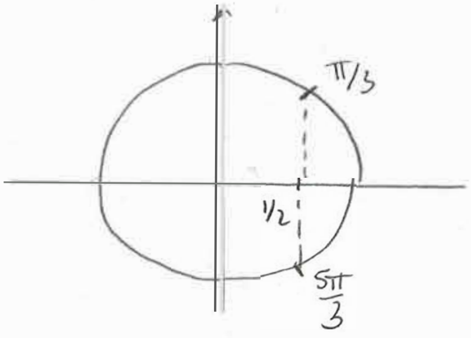
Réponse : 36 cm , Note: Nous aurions pu tout simplement trouver cet écart avec 2a = 36

Min $= k - a = 95 - 18 = \underline{77\text{ cm}}$

b) $p = \frac{2\pi}{b} = \frac{2\pi}{\frac{2\pi}{15}} = \underline{15\text{ sec}}$

c) $104 = 18 \cos \frac{2\pi}{15} x + 95$

$\frac{1}{2} = \cos \frac{2\pi}{15} x$



$\rightarrow p = \frac{2\pi}{\frac{2\pi}{15}}$

$\frac{2\pi x}{15} = \frac{\pi}{3} \Rightarrow x = \frac{\pi}{3} \cdot \frac{15}{2\pi} \Rightarrow x = 2{,}5 + 15n$

$n \in \mathbb{Z}$

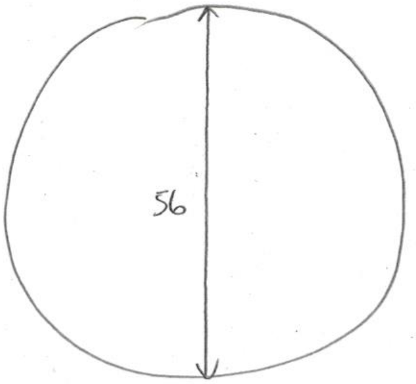
$\frac{2\pi x}{15} = \frac{5\pi}{3} \Rightarrow x = \frac{5\pi}{3} \cdot \frac{15}{2\pi} \Rightarrow x = 12{,}5 + 15n$

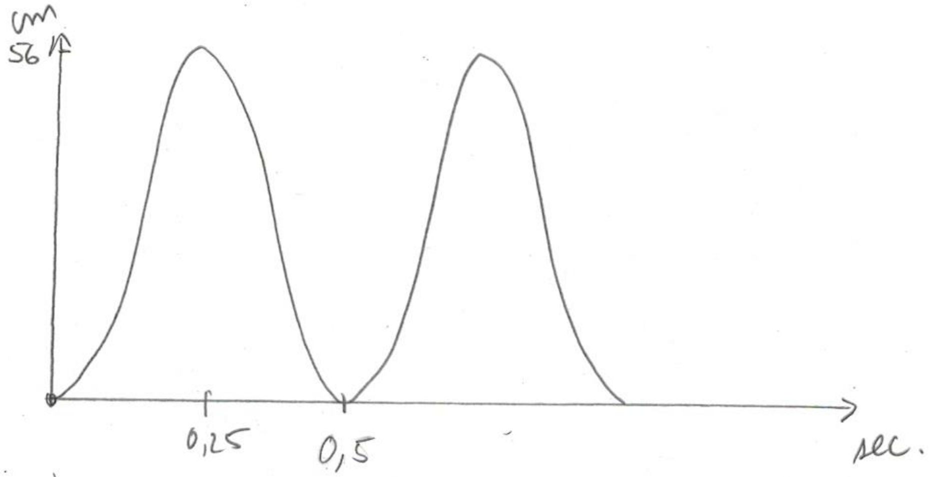
rep: 2,5 s, 17,5 s, 32,5 s

12,5 s, 27,5 s

+15

#22





$\underline{p = 0{,}5 \text{ sec}}$ car $0{,}25 \text{ sec} \to 0.5t$
$x \leftarrow 1t$

$y = a\cos b(x-h) + k$

ampli. $= \frac{1}{2} \cdot 56 = 28$ donc $a = -28$ car $\cap$

$b = ?$ $\quad p = 0.5 = \frac{2\pi}{b} \Rightarrow b = 4\pi$

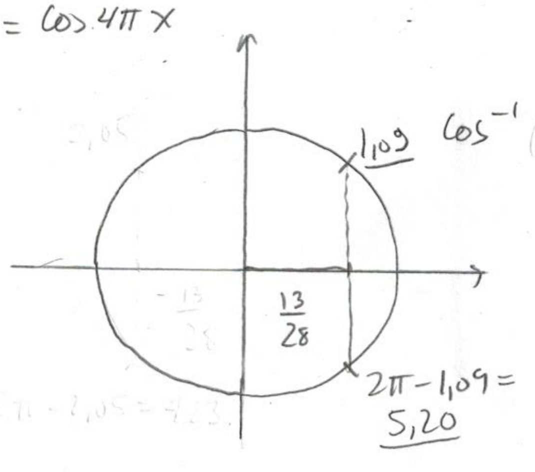
$h = 0$

$k =$ milieu entre max et min donc 28

$y = -28\cos 4\pi x + 28$

$15 = -28\cos 4\pi x + 28$

$\frac{13}{28} = \cos 4\pi x$



$\cos^{-1}\left(\frac{13}{28}\right) = 1{,}09$

$4\pi x = 1{,}09 \Rightarrow x = 0{,}087 + 0{,}5n$ $\quad n \in \mathbb{Z}$

$4\pi x = 5{,}20 \Rightarrow x = 0{,}413 + 0{,}5n$

rép: $0{,}087 s$, $0{,}587 s$
$0{,}413 s$, $0{,}913 s$

$+0{,}5$

#23

a) $\sin^{-1}\frac{\sqrt{3}}{2} = \frac{\pi}{3}$

b) $\arccos -1 = \pi$

c) $\sin^{-1}\frac{1}{2} = \frac{\pi}{6}$

d) $\cos(\cos^{-1} 1)$

$= \cos 0$

$= 1$

e) $\cancel{\arcsin}\left(\cancel{\sin}\frac{\pi}{2}\right) = \frac{\pi}{2}$

f) $\sin\left(\arccos\frac{1}{2}\right)$

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

g) $\arccos\left(\sin\frac{\pi}{6}\right)$

$= \arccos\frac{1}{2}$

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

h) $\sin\left(\cos^{-1}\left(-\frac{1}{2}\right)\right)$

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

i) $\cos\left(\arcsin\frac{\sqrt{2}}{2}\right)$

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

#24 a) $\tan^2\theta\cos^2\theta + \cos^2\theta = 1$

$\frac{\sin^2\theta}{\cos^2\theta}\cos^2\theta + \cos^2\theta$

$\sin^2\theta + \cos^2\theta = 1$ □

b) $\sin^2\theta\cot^2\theta\sec\theta = \cos\theta$

$\sin^2\theta \cdot \frac{\cos^2\theta}{\sin^2\theta} \cdot \frac{1}{\cos\theta}$

$= \cos\theta$ □

c) $\sec\theta - \cos\theta = \sin\theta\tan\theta$

$\frac{1}{\cos\theta} - \frac{\cos\theta}{1}$

$\frac{1}{\cos\theta} - \frac{\cos^2\theta}{\cos\theta}$

$\frac{1-\cos^2\theta}{\cos\theta} = \frac{\sin^2\theta}{\cos\theta} = \sin\theta \cdot \frac{\sin\theta}{\cos\theta} = \sin\theta\tan\theta$ □

d) $(1-\cos^2\theta)(1+\tan^2\theta) = \tan^2\theta$

$\sin^2\theta \cdot \sec^2\theta$

$\sin^2\theta \cdot \frac{1}{\cos^2\theta} = \frac{\sin^2\theta}{\cos^2\theta} = \tan^2\theta$ □

e) $(1+\tan^2\theta)(1-\sin^2\theta) = 1$

$\sec^2\theta \cdot \cos^2\theta$

$\frac{1}{\cos^2\theta}\cos^2\theta = 1$

□

#24 f) $(\sec\theta - \tan\theta)^2 = \dfrac{1-\sin\theta}{1+\sin\theta}$

$$\left(\frac{1}{\cos\theta} - \frac{\sin\theta}{\cos\theta}\right)^2$$

$$\left(\frac{1-\sin\theta}{\cos\theta}\right)^2 = \frac{(1-\sin\theta)(1-\sin\theta)}{\cos^2\theta} = \frac{(1-\sin\theta)(1-\sin\theta)}{1-\sin^2\theta}$$

$$= \frac{(1-\sin\theta)\cancel{(1-\sin\theta)}}{(1+\sin\theta)\cancel{(1-\sin\theta)}}$$

Difference de carrés!

$\square$

g) $1-2\sin^2\theta = 2\cos^2\theta - 1$

$$1-2(1-\cos^2\theta)$$
$$= 1-2+2\cos^2\theta$$
$$= 2\cos^2\theta - 1 \quad \square$$

h) $\tan\theta + \cot\theta = \sec\theta\csc\theta$

$$\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}$$

$$\frac{\sin^2\theta}{\cos\theta\sin\theta} + \frac{\cos^2\theta}{\sin\theta\cos\theta}$$

$$\frac{\sin^2\theta + \cos^2\theta}{\cos\theta\sin\theta} = \frac{1}{\cos\theta\sin\theta} = \sec\theta\csc\theta \quad \square$$

#25 a) $\tan^2\theta + \sin^2\theta - \tan^2\theta\cos^2\theta = \tan^2\theta$

$$\frac{\sin^2\theta}{\cos^2\theta} + \sin^2\theta - \frac{\sin^2\theta}{\cancel{\cos^2\theta}}\cancel{\cos^2\theta}$$

$$\frac{\sin^2\theta}{\cos^2\theta} + \cancel{\sin^2\theta} - \cancel{\sin^2\theta}$$

$$\frac{\sin^2\theta}{\cos^2\theta} = \tan^2\theta \quad \square$$

#25 b) $\dfrac{\sin\theta \sec\theta \cot\theta}{\csc\theta} = \sin\theta$

$$\frac{\cancel{\sin\theta} \cdot \dfrac{1}{\cancel{\cos\theta}} \cdot \dfrac{\cancel{\cos\theta}}{\cancel{\sin\theta}}}{\dfrac{1}{\sin\theta}} = \sin\theta \quad \square$$

c) $\dfrac{\cos\theta}{1} + \dfrac{\sin^2\theta}{\cos\theta} = \sec\theta$

$$\frac{\cos^2\theta}{\cos\theta} + \frac{\sin^2\theta}{\cos\theta}$$

$$\frac{1}{\cos\theta} = \sec\theta \quad \square$$

d) $\sin\theta \cdot \sec^2\theta - \sin\theta \tan^2\theta = \sin\theta$

$$\sin\theta \cdot \frac{1}{\cos^2\theta} - \sin\theta \cdot \frac{\sin^2\theta}{\cos^2\theta}$$

$$= \frac{\sin\theta}{\cos^2\theta} - \frac{\sin^3\theta}{\cos^2\theta}$$

$$= \frac{\sin\theta - \sin^3\theta}{\cos^2\theta}$$

$$= \frac{\sin\theta(1 - \sin^2\theta)}{\cos^2\theta} \quad : \underline{\text{MES}}$$

$$= \frac{\sin\theta \cdot \cancel{\cos^2\theta}}{\cancel{\cos^2\theta}} = \sin\theta \quad \square$$

e) $\sin\theta + \cot\theta \cos\theta = \csc\theta$

$$\sin\theta + \frac{\cos\theta}{\sin\theta} \cos\theta$$

$$= \sin\theta + \frac{\cos^2\theta}{\sin\theta}$$

$$= \frac{\sin^2\theta}{\sin\theta} + \frac{\cos^2\theta}{\sin\theta}$$

$$= \frac{1}{\sin\theta} = \csc\theta \quad \square$$

#26 a) $\tan\theta(\sin\theta + \cot\theta \cos\theta) = \sec\theta$

$$= \tan\theta \sin\theta + \tan\theta \cot\theta \cos\theta$$

$$= \frac{\sin\theta}{\cos\theta} \cdot \sin\theta + \frac{\cancel{\sin\theta}}{\cancel{\cos\theta}} \cdot \frac{\cancel{\cos\theta}}{\cancel{\sin\theta}} \cdot \cos\theta$$

$$= \frac{\sin^2\theta}{\cos\theta} + \cos\theta$$

$$= \frac{\sin^2\theta}{\cos\theta} + \frac{\cos^2\theta}{\cos\theta}$$

$$= \frac{1}{\cos\theta} = \sec\theta \quad \square$$

b) $\sin\theta + \cos\theta \cot\theta = \csc\theta$

$$\sin\theta + \cos\theta \frac{\cos\theta}{\sin\theta}$$

$$\sin\theta + \frac{\cos^2\theta}{\sin\theta}$$

$$\frac{\sin^2\theta}{\cos\theta} + \frac{\cos^2\theta}{\sin\theta}$$

$$\frac{1}{\cos\theta} = \sec\theta \quad \square$$

#26c) $(\sec\theta + \tan\theta - 1)(\sec\theta - \tan\theta + 1) = 2\tan\theta$

$\sec^2\theta - \cancel{\sec\theta\tan\theta} + \cancel{\sec\theta} + \cancel{\sec\theta\tan\theta} - \tan^2\theta + \tan\theta - \cancel{\sec\theta} + \tan\theta - 1$

$\sec^2\theta - \tan^2\theta + 2\tan\theta - 1$

$\cancel{\tan^2\theta} + \cancel{1} - \cancel{\tan^2\theta} + 2\tan\theta - \cancel{1}$ $\square$

d) $\dfrac{\cos^2\theta}{1-\sin\theta} = 1 + \sin\theta$

$\dfrac{1-\sin^2\theta}{1-\sin\theta} = \dfrac{(1+\sin\theta)\cancel{(1-\sin\theta)}}{\cancel{1-\sin\theta}}$ $\square$ Difference de carrés

e) $\dfrac{1+\tan^2\theta}{\csc^2\theta} = \tan^2\theta$

$\dfrac{\sec^2\theta}{\csc^2\theta} = \dfrac{\frac{1}{\cos^2\theta}}{\frac{1}{\sin^2\theta}} = \dfrac{1}{\cos^2\theta}\cdot\dfrac{\sin^2\theta}{1} = \dfrac{\sin^2\theta}{\cos^2\theta} = \tan^2\theta$ $\square$

f) $\dfrac{\sin\theta}{\sin\theta + \cos\theta} = \dfrac{\tan\theta}{1+\tan\theta}$

Débutons par le membres de droite!

$\dfrac{\frac{\sin\theta}{\cos\theta}}{1+\frac{\sin\theta}{\cos\theta}} = \dfrac{\frac{\sin\theta}{\cos\theta}}{\frac{\cos\theta}{\cos\theta}+\frac{\sin\theta}{\cos\theta}} = \dfrac{\frac{\sin\theta}{\cos\theta}}{\frac{\cos\theta+\sin\theta}{\cos\theta}} = \dfrac{\sin\theta}{\cancel{\cos\theta}}\cdot\dfrac{\cancel{\cos\theta}}{\cos\theta+\sin\theta}$

$\square$

g) $\dfrac{\cos\theta}{1+\sin\theta} + \dfrac{\cos\theta}{1-\sin\theta} = 2\sec\theta$

$\dfrac{\cos\theta\ (1-\sin\theta)}{(1+\sin\theta)(1-\sin\theta)} + \dfrac{\cos\theta\ (1+\sin\theta)}{(1-\sin\theta)(1+\sin\theta)}$

$\dfrac{\cos\theta - \cos\theta\sin\theta}{1-\sin^2\theta} + \dfrac{\cos\theta + \cos\theta\sin\theta}{1-\sin^2\theta} = \dfrac{\cos\theta - \cancel{\cos\theta\sin\theta} + \cos\theta + \cancel{\cos\theta\sin\theta}}{1-\sin^2\theta}$

$= \dfrac{2\cos\theta}{\cos^2\theta} = \dfrac{2}{\cos\theta} = 2\sec\theta$ $\square$

#26h) $\sec\theta - \cos\theta = \sin\theta\tan\theta$

$$\frac{1}{\cos\theta} - \cos\theta$$

$$\frac{1}{\cos\theta} - \frac{\cos^2\theta}{\cos\theta}$$

$$\frac{1-\cos^2\theta}{\cos\theta} = \frac{\sin^2\theta}{\cos\theta} = \sin\theta \cdot \frac{\sin\theta}{\cos\theta} = \sin\theta\tan\theta \quad \square$$

#27 a) $\dfrac{\tan^2\theta}{1+\tan^2\theta} \cdot \dfrac{1+\cot^2\theta}{\cot^2\theta} = \sin^2\theta\sec^2\theta$

$$\frac{\frac{\sin^2\theta}{\cos^2\theta}}{\sec^2\theta} \cdot \frac{\csc^2\theta}{\frac{\cos^2\theta}{\sin^2\theta}} = \frac{\frac{\sin^2\theta}{\cos^2\theta}}{\frac{1}{\cos^2\theta}} \cdot \frac{\frac{1}{\sin^2\theta}}{\frac{\cos^2\theta}{\sin^2\theta}}$$

$$= \frac{\sin^2\theta}{\cancel{\cos^2\theta}} \cdot \cancel{\cos^2\theta} \cdot \frac{1}{\cancel{\sin^2\theta}} \cdot \frac{\cancel{\sin^2\theta}}{\cos^2\theta} = \sin^2\theta \cdot \frac{1}{\cos^2\theta}$$

$$= \sin^2\theta \cdot \sec^2\theta \quad \square$$

b) $(\sin\theta + \csc\theta)^2 + (\cos\theta + \sec\theta)^2 = \tan^2\theta + \cot^2\theta + 7$

$$\underline{\sin^2\theta} + 2\sin\theta\csc\theta + \csc^2\theta + \underline{\cos^2\theta} + 2\cos\theta\sec\theta + \sec^2\theta$$

$$\underbrace{\underbrace{\sin^2\theta + \cos^2\theta}_{1} + 2\cancel{\sin\theta}\cdot\frac{1}{\cancel{\sin\theta}} + 2\cancel{\cos\theta}\cdot\frac{1}{\cancel{\cos\theta}}}_{5} + \csc^2\theta + \sec^2\theta$$

$$5 + \csc^2\theta + \sec^2\theta$$

$$5 + \cot^2\theta + 1 + \tan^2\theta + 1$$

$$\cot^2\theta + \tan^2\theta + 7 \quad \square$$

c) $\sec^4\theta - 1 = 2\tan^2\theta + \tan^4\theta$

$\underbrace{(\sec^2\theta - 1)}_{}(\sec^2\theta + 1)$: Diff. de carrés.

$$\tan^2\theta\,(\sec^2\theta + 1)$$

$$\tan^2\theta\,(\tan^2\theta + 1 + 1)$$

$$\tan^2\theta\,(\tan^2\theta + 2) \rightarrow \tan^4\theta + 2\tan^2\theta \quad \square$$

#27 d) $\sin^4\theta - \cos^4\theta = 1 - 2\cos^2\theta$

$(\sin^2\theta + \cos^2\theta)(\sin^2\theta - \cos^2\theta)$: difference de carrés.

$1 \cdot (1 - \cos^2\theta - \cos^2\theta) = 1 - 2\cos^2\theta$ □

e) $(1+\tan\theta)^2 + (1-\tan\theta)^2 = 2\sec^2\theta$

$1 + \cancel{2\tan\theta} + \tan^2\theta + 1 - \cancel{2\tan\theta} + \tan^2\theta$

$2 + 2\tan^2\theta$

$2 + 2(\sec^2\theta - 1)$ car $1 + \tan^2\theta = \sec^2\theta$

$2 + 2\sec^2\theta - 2$

$2\sec^2\theta$ □

f) $\sin^2\theta\,(1+\cot^2\theta) + \cos^2\theta\,(1+\tan^2\theta) = 2$

$\sin^2\theta \cdot \csc^2\theta + \cos^2\theta \cdot \sec^2\theta$

$\sin^2\theta \cdot \frac{1}{\sin^2\theta} + \cos^2\theta \cdot \frac{1}{\cos^2\theta}$

$1 + 1 = 2$ □

g) $(1 - \sin\theta + \cos\theta)^2 = 2\cdot(1-\sin\theta)(1+\cos\theta)$

$(1 - \sin\theta + \cos\theta)(1 - \sin\theta + \cos\theta)$

$1 - \sin\theta + \cos\theta - \sin\theta + \sin^2\theta - \sin\theta\cos\theta + \cos\theta - \sin\theta\cos\theta + \cos^2\theta$

$1 - 2\sin\theta + 2\cos\theta + \underbrace{\sin^2\theta + \cos^2\theta}_{1} - 2\sin\theta\cos\theta$

$2 - 2\sin\theta + 2\cos\theta - 2\sin\theta\cos\theta$

$2(1 - \sin\theta + \cos\theta - \sin\theta\cos\theta)$

$2(1 - \sin\theta + \cos\theta(1 - \sin\theta))$ MES. de $\cos\theta$

$2[(1-\sin\theta)(1+\cos\theta)]$ MES de $(1-\sin\theta)$

□

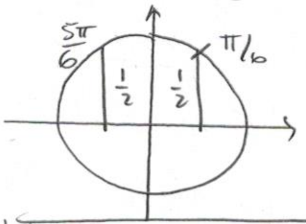
#27h) $\dfrac{\sec^2\theta \cdot \cot\theta}{\csc^2\theta} = \tan\theta$

$$\frac{\dfrac{1}{\cos^{\cancel{2}}\theta} \cdot \dfrac{\cancel{\cos\theta}}{\sin\theta}}{\dfrac{1}{\sin^2\theta}} = \frac{\dfrac{1}{\cos\theta\sin\theta}}{\dfrac{1}{\sin^2\theta}} = \frac{1}{\cos\theta\,\cancel{\sin\theta}} \cdot \frac{\sin^{\cancel{2}}\theta}{1} = \frac{\sin\theta}{\cos\theta} = \tan\theta \quad \square$$

#28a) $(2\sin x - 1)(\sin x + 0.5) = 0$

$2\sin x - 1 = 0$

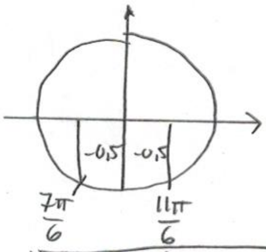
$\sin x = \frac{1}{2}$



$$\boxed{\begin{aligned} x &= \frac{5\pi}{6} + 2\pi n \\ x &= \frac{\pi}{6} + 2\pi n \end{aligned}} \quad n \in \mathbb{Z}$$

$\sin x + 0.5 = 0$

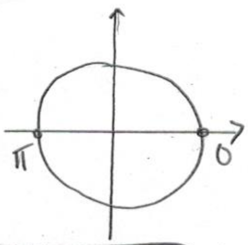
$\sin x = -0.5$



$$\boxed{\begin{aligned} x &= \frac{7\pi}{6} + 2\pi n \\ x &= \frac{11\pi}{6} + 2\pi n \end{aligned}} \quad n \in \mathbb{Z}$$

b) $\sin x\,(3\sin x - 2) = 0$

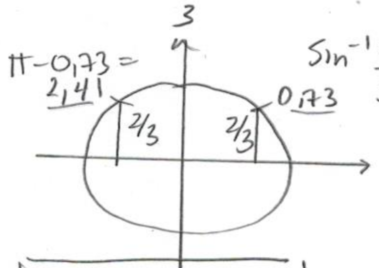
$\sin x = 0$



$$\boxed{\begin{aligned} x &= 0 + 2\pi n \\ x &= \pi + 2\pi n \end{aligned}}$$

$3\sin x - 2 = 0$

$\sin x = \frac{2}{3}$



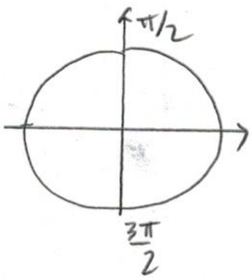
$$\boxed{\begin{aligned} x &= 0.73 + 2\pi n \\ x &= 2.41 + 2\pi n \end{aligned}} \quad n \in \mathbb{Z}$$

c) $\cos x \sin x = -\cos x$

$\cos x \sin x + \cos x = 0$

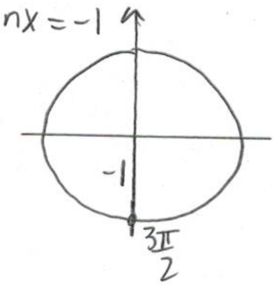
$\cos x\,(\sin x + 1) = 0$

$\cos x = 0$



$\sin x + 1 = 0$

$\sin x = -1$



$$\boxed{\begin{aligned} x &= \frac{\pi}{2} + 2\pi n \\ x &= \frac{3\pi}{2} + 2\pi n \end{aligned}}$$

idem

$x = \frac{3\pi}{2} + 2\pi n$

$n \in \mathbb{Z}$

d) $2\sec x = \cos x + 1$

$\dfrac{2}{\cos x} \cdot \cos x = \cos x + 1 \cdot \cos x$

$2 = \cos^2 x + \cos x$

$0 = \cos^2 x + \cos x - 2$

$0 = (\cos x + 2)(\cos x - 1)$

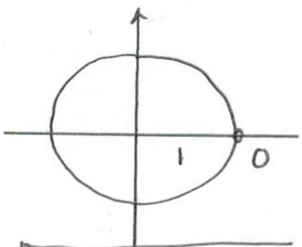
$\cos x + 2 = 0$

$\cos x = -2$

$\varnothing$

$\cos x - 1 = 0$

$\cos x = 1$



$$\boxed{x = 0 + 2\pi n}$$

$n \in \mathbb{Z}$

28 e) $\tan x + 3\cot x = 4$

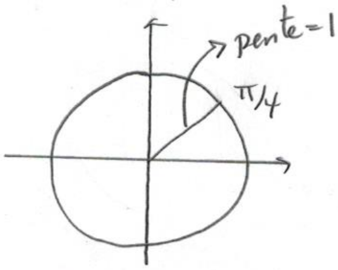
$$\tan x + \frac{3}{\tan x} = 4 \quad \cdot \tan x$$

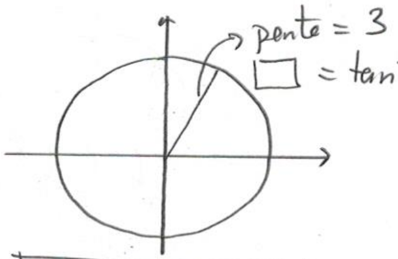
$$\tan^2 x + 3 = 4\tan x$$

$$\tan^2 x - 4\tan x + 3 = 0$$

$$(\tan x - 1)(\tan x - 3) = 0$$

$\tan x - 1 = 0$	$\tan x - 3 = 0$
$\tan x = 1$	$\tan x = 3$





$\square = \tan^{-1} 3 = 1{,}25$

$$\boxed{x = \frac{\pi}{4} + \pi n} \qquad \boxed{x = 1{,}25 + \pi n}$$

$n \in \mathbb{Z}$

f) $2 - 2\sin^2 x = 11\cos x - 5$

$$2 - 2(1 - \cos^2 x) = 11\cos x - 5$$

$$\cancel{2} - \cancel{2} + 2\cos^2 x = 11\cos x - 5$$

Methode S–P

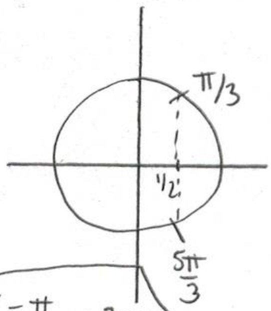
$$2\cos^2 x - 11\cos x + 5 = 0 \to \text{P: } 10 \quad \text{S: } -11 \qquad \boxed{-1}\ \boxed{-10}$$

$$2\cos^2 x - \cos x - 10\cos x + 5 = 0$$

$$\cos x(2\cos x - 1) - 5(2\cos x - 1) = 0$$

$$(2\cos x - 1)(\cos x - 5) = 0$$

$2\cos x - 1 = 0$	$\cos x - 5 = 0$
$\cos x = \frac{1}{2}$	$\cos x = 5$
	$\emptyset$



$x = \frac{\pi}{3} + 2\pi n$

$x = 5\pi/3 + 2\pi n$ $\quad n \in \mathbb{Z}$

#28 g) $\cot x - 5\csc x + 3\tan x = 0$

$$\frac{\cos x}{\sin x} - \frac{5}{\sin x} + \frac{3\sin x}{\cos x} = 0$$

$\cdot \cos x \sin x$

$\cdot \cos x \sin x$

$$\frac{\cos^2 x}{\sin x \cos x} - \frac{5\cos x}{\sin x \cos x} + \frac{3\sin^2 x}{\cos x \sin x} = 0$$

$$\cos^2 x - 5\cos x + 3\sin^2 x = 0$$

$$\cos^2 x - 5\cos x + 3(1-\cos^2 x) = 0$$

$$\cos^2 x - 5\cos x + 3 - 3\cos^2 x = 0$$

$$-2\cos^2 x - 5\cos x + 3 = 0$$

Methode S-P

$P = -6$

$S = -5$

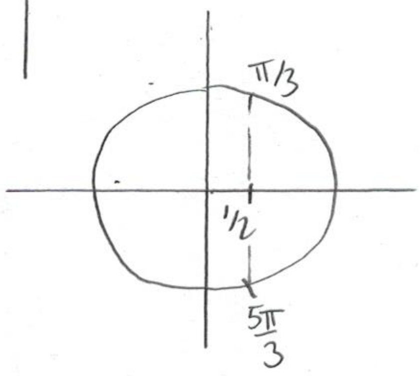
$\boxed{-6}$ $\boxed{1}$

$$-2\cos^2 x - 6\cos x + \cos x + 3 = 0$$

$$-2\cos x(\cos x + 3) + 1(\cos x + 3) = 0$$

$$(\cos x + 3)(-2\cos x + 1) = 0$$

$\cos x + 3 = 0$	$-2\cos x + 1 = 0$
$\cos x = -3$	$\cos x = \frac{1}{2}$
$\varnothing$	



$$\boxed{\begin{array}{l} x = \frac{\pi}{3} + 2\pi n \\ x = \frac{5\pi}{3} + 2\pi n \end{array}}$$

$n \in \mathbb{Z}$

#29 $\frac{17\pi}{4}$ rad $= xt$

2π rad $= 1t$

$$\frac{\frac{17\pi}{4}}{2\pi} = \frac{17}{8} = 2{,}125 \text{ tours}$$

#30 $150° = x$ rad

$180° = \pi$ rad

$$\frac{150\pi}{180} = \frac{15\pi}{18} = \frac{5\pi}{6} \text{ rad}$$

#31 a) 5 radians $\times 57{,}3° = 286{,}5°$

b) $\frac{15\pi}{3} = 15 \times 60°$ ou $\frac{15 \times 180}{3} = 900°$

#32 $L = \theta r$

$L = \frac{4\pi}{3} \cdot 13 = 54{,}45$ cm

#33 $L = \theta r$

$4\pi = \theta \cdot 8$

$\frac{4\pi}{8} = \theta$ ou $\theta = \frac{\pi}{2}$ rad

#34 a) $\sin \frac{\pi}{2} = 1$

b) $\sin \frac{5\pi}{4} = -\frac{\sqrt{2}}{2}$

c) $\cos \frac{\pi}{3} = \frac{1}{2}$

d) $\cos \frac{7\pi}{6} = -\frac{\sqrt{3}}{2}$

e) $\sin \frac{11\pi}{6} = -\frac{1}{2}$

f) $\cos \frac{5\pi}{4} = -\frac{\sqrt{2}}{2}$

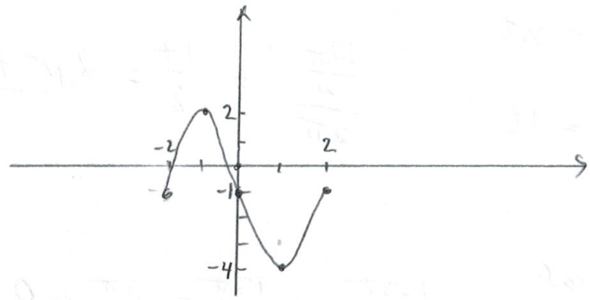
g) $\sin \frac{4\pi}{3} = -\frac{\sqrt{3}}{2}$

h) $\cos \pi = -1$

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

j) $\cos \frac{5\pi}{3} = \frac{1}{2}$

#35 a) $y = 3\sin\frac{\pi}{2}(x+2) - 1$



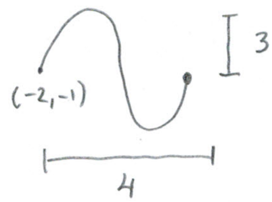
$amp = 3$

$p = \frac{2\pi}{\frac{\pi}{2}} = 4$

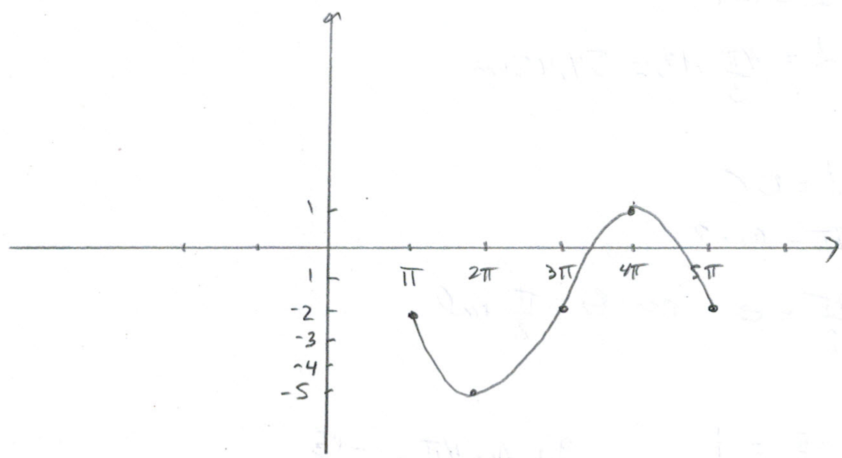
$h = -2$

$k = -1$

allure



b) $y = 3\sin\frac{1}{2}(x-\pi) - 2$

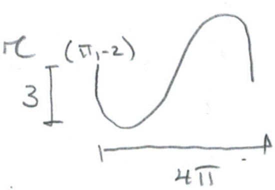


$amp = 3$

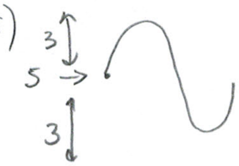
$p = \frac{2\pi}{b} = \frac{2\pi}{\frac{1}{2}} = 4\pi$

$(h,k) = (\pi, -2)$

allure



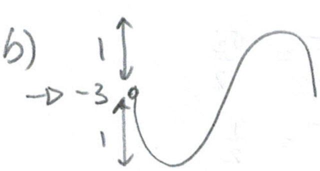
#36 a)



$Max = 5+3 = 8$

$Min = 5-3 = 2$

b)

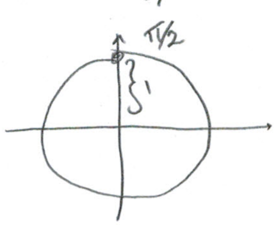


$Max = -3+1 = -2$

$Min = -3-1 = -4$

#37 a) $0 = -\sin\frac{\pi}{4}(x+2) + 1$

$1 = \sin\frac{\pi}{4}(x+2)$



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

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

$x + 2 = 2$

$\boxed{x = 0 + 8n}$ $n \in \mathbb{Z}$

#37 b) $0 = 2\sin x + 4$

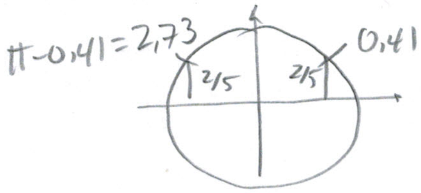
$-2 = \sin x$

$\emptyset$ car $-1 \leq \sin x \leq 1$

c) $0 = -5 \sin \frac{2\pi}{3}(x+1) + 2$

$p = \frac{2\pi}{\frac{2\pi}{3}} = 3$

$\frac{2}{5} = \sin \frac{2\pi}{3}(x+1)$



$0,41 = \frac{2\pi}{3}(x+1) \Rightarrow 0,2 = x+1 \Rightarrow x = -0,80 + 3n$

$n \in \mathbb{Z}$

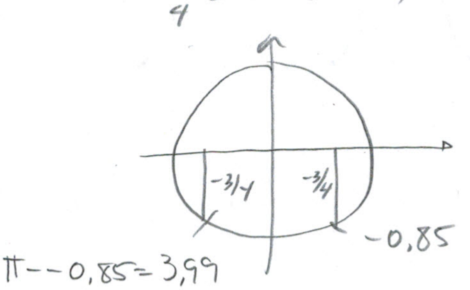
$2,73 = \frac{2\pi}{3}(x+1) \Rightarrow 1,3 = x+1 \Rightarrow x = 0,30 + 3n$.

$\sin^{-1}\left(\frac{2}{5}\right) = 0,41$

d) $0 = 4\sin(2x-5) + 3$

$p = \frac{2\pi}{2} = \pi$

$-\frac{3}{4} = \sin(2x-5)$



$2x - 5 = -0,85 \Rightarrow x = 2,075 + \pi n$

$n \in \mathbb{Z}$

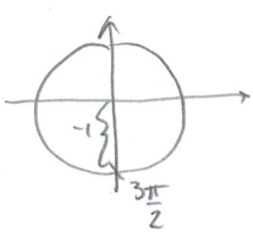
$2x - 5 = 3,99 \Rightarrow x = 4,5 + \pi n$

$\sin^{-1}\left(-\frac{3}{4}\right) = -0,85$

#38 $0 = \sin \pi(x-1) + 1$

$p = \frac{2\pi}{\pi} = 2$

$-1 = \sin \pi(x-1)$



$\pi(x-1) = \frac{3\pi}{2}$

$x - 1 = \frac{3}{2}$

$x = 2,5 + 2n$

$\xleftarrow{-2}\ \xrightarrow{+2}$

$0,5,\ \underline{\underline{2,5}},\ 4,5,\ 6,5$

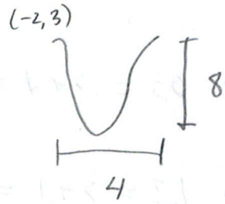
#39 a) $y = 4\cos\frac{\pi}{2}(x+2) - 1$

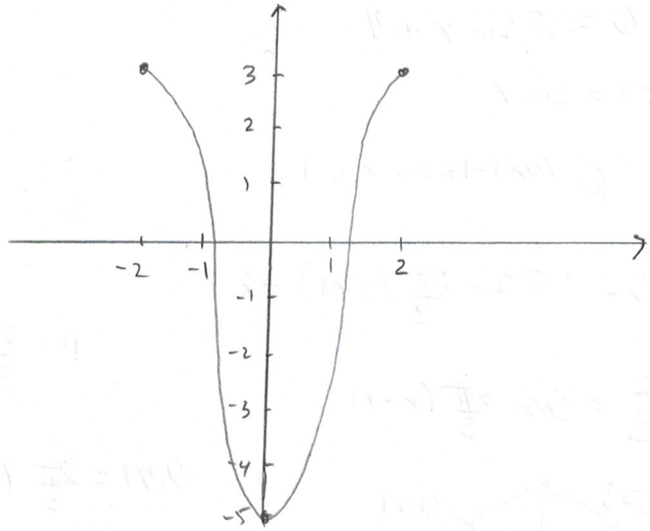
$amp = 4$

$p = \frac{2\pi}{b} = \frac{2\pi}{\frac{\pi}{2}} = 4$

$(h, k+a) = (-2, 3)$

allure





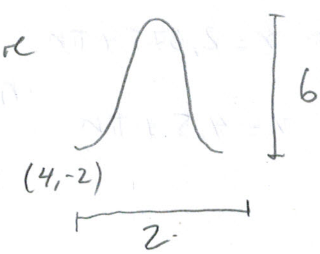
b) $y = -3\cos\pi(x-4) + 1$

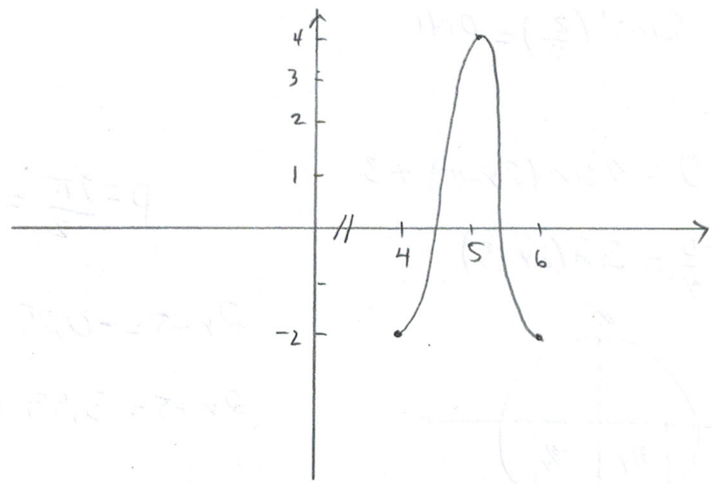
$amp = 3$

$p = \frac{2\pi}{\pi} = 2$

$(h, k+a) = (4, -2)$

allure

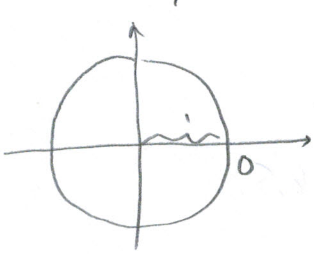




#40 a) $0 = -\cos\frac{\pi}{4}(x+3) + 1$

$1 = \cos\frac{\pi}{4}(x+3)$

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



$\frac{\pi}{4}(x+3) = 0$

$x + 3 = 0$

$\boxed{x = -3 + 8n}$ $n \in \mathbb{Z}$

#40b) $0 = 2\cos \pi x - 6$

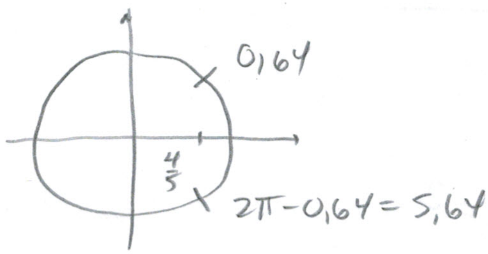
$3 = \cos \pi x$

$\emptyset$ car $-1 \le \cos x \le 1$

c) $0 = -5\cos \frac{2\pi}{5}(x-1) + 4$

$\frac{4}{5} = \cos \frac{2\pi}{5}(x-1)$

$p = \frac{2\pi}{\frac{2\pi}{5}} = 5$



$\cos^{-1}\left(\frac{4}{5}\right) = 0{,}64$

$\frac{2\pi}{5}(x-1) = 0{,}64 \Rightarrow x - 1 = 0{,}51 \Rightarrow x = 1{,}51 + 5n$

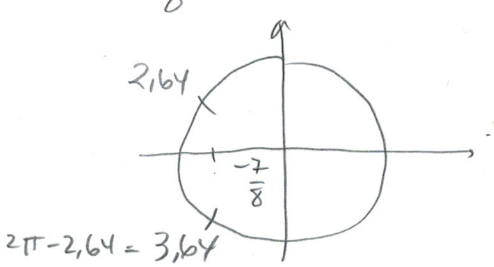
$n \in \mathbb{Z}$

$\frac{2\pi}{5}(x-1) = 5{,}64 \Rightarrow x - 1 = 4{,}89 \Rightarrow x = 5{,}89 + 5n$

d) $0 = 8\cos(4x-3) + 7$

$-\frac{7}{8} = \cos(4x-3)$

$p = \frac{2\pi}{4} = \frac{\pi}{2}$



$\cos^{-1}\left(-\frac{7}{8}\right) = 2{,}64$

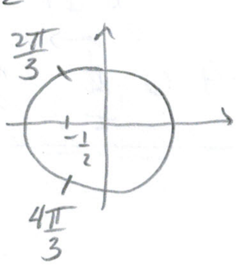
$4x - 3 = 2{,}64 \Rightarrow x = 1{,}41 + \frac{\pi}{2}n$

$n \in \mathbb{Z}$

$4x - 3 = 3{,}64 \Rightarrow x = 1{,}66 + \frac{\pi}{2}n$

#41 $0 = 2\cos \pi(x-1) + 1$

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



$\overset{-2}{\longleftarrow} \quad \overset{+2}{\longrightarrow}$

$\cancel{-0,\overline{3}}$, $1,\overline{6}$, $3,\overline{6}$, $\cancel{5,\overline{6}}$

$\pi(x-1) = \frac{2\pi}{3} \Rightarrow x = 1,\overline{6} + 2n$

$\pi(x-1) = \frac{4\pi}{3} \Rightarrow x = 2,\overline{3} + 2n$

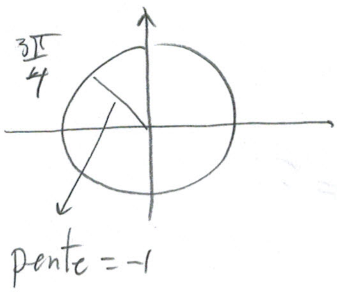
$\cancel{-1,\overline{6}}$, $0,\overline{3}$, $2,\overline{3}$, $\cancel{4,\overline{3}}$

$\underset{-2}{\longleftarrow} \quad \underset{+2}{\longrightarrow}$

#42 a) $0 = 4\tan\frac{\pi}{3}(x-2)+4$

$-1 = \tan\frac{\pi}{3}(x-2)$

$p = \frac{\pi}{\frac{\pi}{3}} = 3$



$\frac{\pi}{3}(x-2) = \frac{3\pi}{4}$

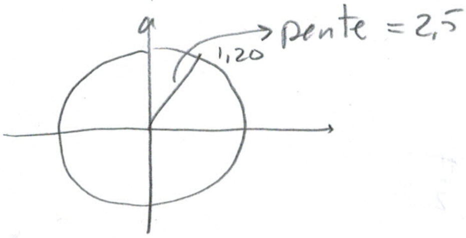
$x-2 = \frac{9}{4}$

$\underline{x = 4{,}25 + 3n}$

b) $0 = 2\tan\frac{\pi}{2}(x+1)-5$

$2{,}5 = \tan\frac{\pi}{2}(x+1)$

$p = \frac{\pi}{\frac{\pi}{2}} = 2$



$\tan^{-1}(2{,}5) = 1{,}20$

$\frac{\pi}{2}(x+1) = 1{,}20$

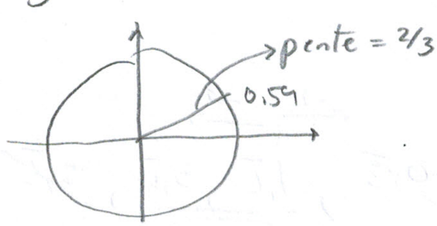
$x+1 = 0{,}76$

$\underline{x = -0{,}24 + 2n}$

c) $0 = 3\tan\pi(x-4)-2$

$\frac{2}{3} = \tan\pi(x-4)$

$p = \frac{\pi}{\pi} = 1$



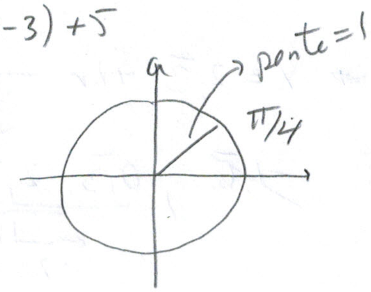
$\tan^{-1}\left(\frac{2}{3}\right) = 0{,}59$

$\pi(x-4) = 0{,}59$

$x = 4{,}19 + 1n$

#43 $0 = -5\tan\frac{\pi}{4}(x-3)+5$

$1 = \tan\frac{\pi}{4}(x-3)$



$p = \frac{\pi}{\frac{\pi}{4}} = 4$

$\frac{\pi}{4}(x-3) = \frac{\pi}{4}$

$x-3 = 1$

$x = 4 + 4n$

-4 +4

$\underline{-4 \quad 0 \quad \underline{4}, \quad 8}$

#44 a) $y = 2\tan \underbrace{5x}_{\frac{\pi}{2}} + 2$

$p = \frac{\pi}{5}$

$5x = \frac{\pi}{2}$

$\boxed{x = \frac{\pi}{10} + \frac{\pi}{5}n}$ $n \in \mathbb{Z}$

b) $y = 3\tan \underbrace{\frac{\pi}{2}(x-2)}_{=\frac{\pi}{2}} + 8$

$p = \frac{\pi}{\frac{\pi}{2}} = 2$

$\frac{\pi}{2}(x-2) = \frac{\pi}{2}$

$x - 2 = 1$

$\boxed{x = 3 + 2n}$ $n \in \mathbb{Z}$

c) $y = -11\tan \underbrace{\pi(x+1)}_{=\frac{\pi}{2}} + 6$

$\pi(x+1) = \frac{\pi}{2}$

$x + 1 = \frac{1}{2}$

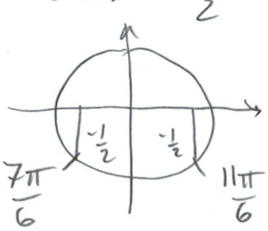
$\boxed{x = -\frac{1}{2} + 1n}$ $n \in \mathbb{Z}$

#45 a) $0 = 2\sin^2 x - \sin x - 1$

$0 = (2\sin x + 1)(\sin x - 1)$

$2\sin x + 1 = 0$ | $\sin x - 1 = 0$

$\sin x = -\frac{1}{2}$ | $\sin x = 1$



$\boxed{x = \frac{\pi}{2} + 2\pi n}$

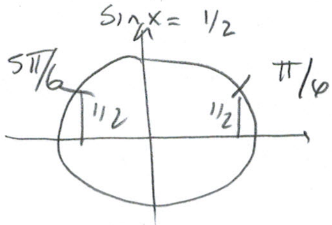
$\boxed{x = \frac{7\pi}{6} + 2\pi n \text{ et } x = \frac{11\pi}{6} + 2\pi n}$

$x = \left\{\frac{\pi}{2}, \frac{7\pi}{6}, \frac{11\pi}{6}\right\}$

#45 b) $0 = 2\sin^2 x + 5\sin x - 3$

$0 = (2\sin x - 1)(\sin x + 3)$

$2\sin x - 1 = 0$	$\sin x + 3 = 0$
$\sin x = 1/2$	$\sin x = -3$
	$\emptyset$ can $-1 \le \sin x \le 1$

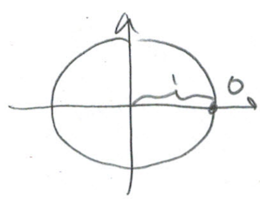


$x = \left\{ \frac{\pi}{6}, \frac{5\pi}{6} \right\}$

c) $0 = \cos^2 x + \cos x - 2$

$0 = (\cos x + 2)(\cos x - 1)$

$\cos x + 2 = 0$	$\cos x - 1 = 0$
$\cos x = -2$	$\cos x = 1$
$\emptyset$	



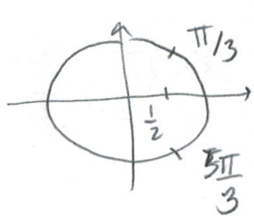
$x = 0 + 2\pi n$

$x = \{0, 2\pi\}$

d) $0 = -2\cos^2 x - 9\cos x + 5$

$0 = (2\cos x - 1)(-\cos x - 5)$

$2\cos x - 1 = 0$	$-\cos x - 5 = 0$
$\cos x = 1/2$	$\cos x = -5$
	$\emptyset$



$x = \left\{ \frac{\pi}{3}, \frac{5\pi}{3} \right\}$