#1. (a) $-2 = 1 + k\sin\frac{\pi}{6}$

$-2 = 1 + k\left(\frac{1}{2}\right)$

$\boxed{k = -6}$

(b) $y = 1 - 6\sin x$

$y_{max} = 1 + 6 = 7,$

$7 = 1 - 6\sin x$

$\sin x = -1$

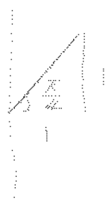
$x = \sin^{-1}(-1) = \frac{3\pi}{2}$

$\Rightarrow \boxed{\left(\frac{3\pi}{2}, 7\right)}$

#2. $f(x) = x - \arctan x$

(a) $f(1) = 1 - \arctan(1)$

$= \boxed{1 - \frac{\pi}{4}}$



$f(-\sqrt{3}) = -\sqrt{3} - \arctan(-\sqrt{3})$

$= \boxed{-\sqrt{3} + \frac{\pi}{3}}$

(b) $f(-x) = -x - \arctan(-x)$

$= -x + \arctan(x)$

$\arctan(-x) = -\arctan(x)$

$-f(x) = -x + \arctan(x)$

$\Rightarrow \therefore f(-x) = -f(x) \Leftarrow$ odd function.

(c) $-\frac{\pi}{2} < \arctan(x) < \frac{\pi}{2}$

$+x \qquad +x \qquad +x$

$\therefore \boxed{x - \frac{\pi}{2} < \arctan x + x < x + \frac{\pi}{2}}$

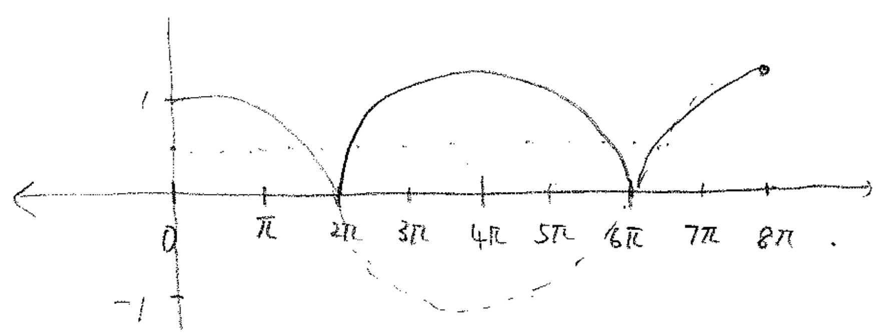
$y = \frac{\pi}{2}$ upper Horizontal Asymptote

$y = -\frac{\pi}{2}$ lower Horizontal Asymptote

#3 (a) $y = \left|\cos\left(\frac{x}{4}\right)\right|$

period: $\frac{2\pi}{\frac{1}{4}} = 8\pi$

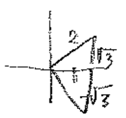
Amplitude: 1



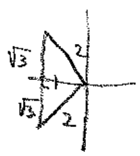
$0 \le x \le 8\pi$

(b) $\left|\cos\left(\frac{x}{4}\right)\right| = \frac{1}{2}$

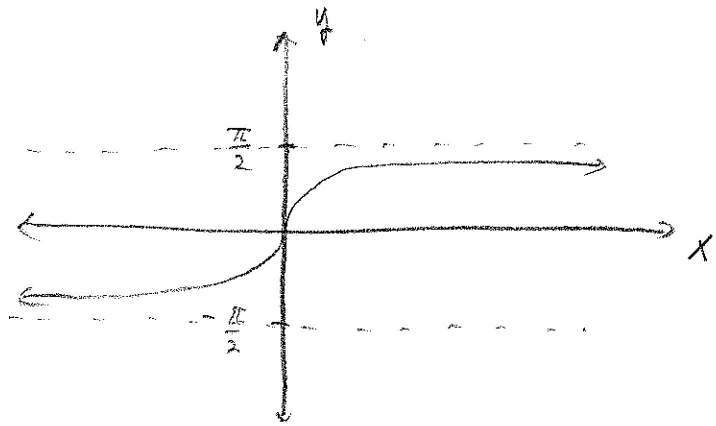
① $\cos\left(\frac{x}{4}\right) = \frac{1}{2} \Rightarrow \frac{x}{4} = \frac{\pi}{3}, \frac{5\pi}{3} \Rightarrow \boxed{x = \frac{4\pi}{3}, \frac{20\pi}{3}}$



② $\cos\left(\frac{x}{4}\right) = -\frac{1}{2} \Rightarrow \frac{x}{4} = \frac{2\pi}{3}, \frac{4\pi}{3} \Rightarrow \boxed{x = \frac{8\pi}{3}, \frac{16\pi}{3}}$



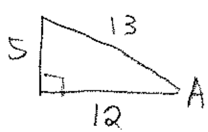
#4 (a) $h(x) = \arctan x$



(b) $(h \circ g)(x) = \arctan\left(\frac{1}{x}\right)$

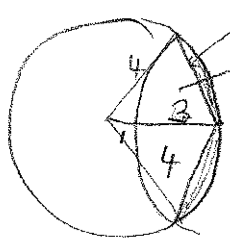
$\boxed{\text{Domain: } \{x : x \neq 0 \;\; x \in \mathbb{R}\}}$

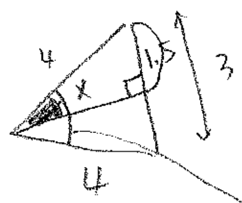
#5.



$\Rightarrow \boxed{\cos A = \frac{12}{13}}$

#6.



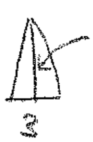


$\sin x = \frac{1.5}{4}$ in radian.

$x = .3844$ radians

$2x = .7688$ radians $= B\hat{O}C$

use calculator

Area of  $h = \sqrt{4^2 - 1.5^2}$

$= \sqrt{13.75}$

$= (3)\sqrt{13.75} \cdot \frac{1}{2}$

$= 5.5621$

Area of sector $= \frac{1}{2}\theta r^2$ (θ must be in radians)

$= \frac{1}{2}(.7688)(4)^2$

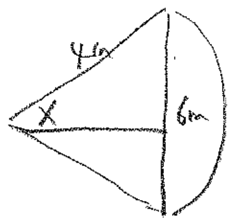
$= 6.15...$

Area $= 2D = 2(6.15 - 5.56) = 1.176 \text{ cm}^2$

(Area of ...

(5)

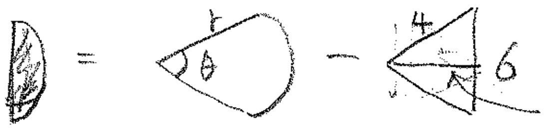
7.



$\sin x = \frac{3}{4}$

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

$A\hat{O}B = (2)\left(\sin^{-1}\left(\frac{3}{4}\right)\right) = \boxed{1.696 \text{ radians}}$. 4. s.f.



$h = \sqrt{4^2 - 3^2} = \sqrt{7}$.

$= \frac{1}{2}(\theta)r^2 - \frac{1}{2}h \cdot b$

$= \frac{1}{2}(1.6961)(4)^2 - \left(\frac{1}{2}\right)(\sqrt{7})(6) = \boxed{5.63 \text{ cm}^2}$

8

Cosine Graph :

period : $(16-4) \cdot 2 = 24$

Amplitude : 8

Axis : 10

H. Shift : 4.

$\Rightarrow \quad f(x) = 8\cos\left[\frac{\pi}{12}(x-4)\right] + 10$

(a) $r = -4$

(b) $p = 8$

$q = \frac{\pi}{12}$.

(c) $8\cos\left[\frac{\pi}{12}(x-4)\right] + 10 = 7$. $\quad 0 \le x \le 20$

Algebraically.

OR

$\cos\left[\frac{\pi}{12}(x-4)\right] = -\frac{3}{8}$.

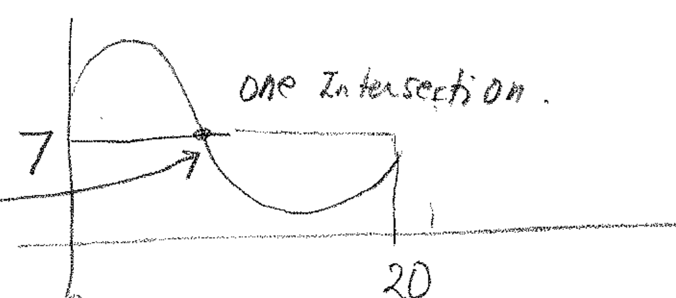
$\frac{\pi}{12}(x-4) = \cos^{-1}\left(-\frac{3}{8}\right)$

$x = \boxed{\cos^{-1}\left(-\frac{3}{8}\right) \cdot \frac{12}{\pi} + 4}$

$\boxed{\approx 11.5}$

radian mode

Use the graph



$\boxed{x = 11.5}$ in 3. s.f.