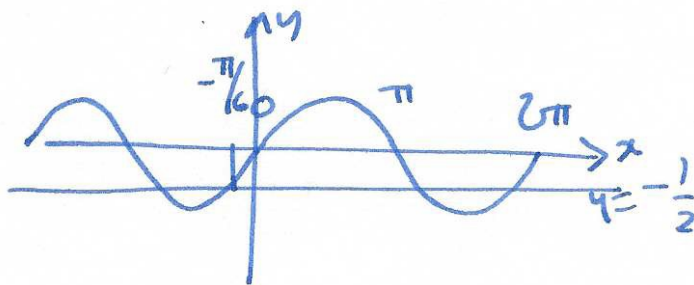


Q6

a)

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



$$\sin\left(-\frac{\pi}{6}\right) = -\frac{1}{2} \Rightarrow \sin\left(-\frac{5\pi}{6}\right) = -\frac{1}{2} \text{ by symmetry}$$

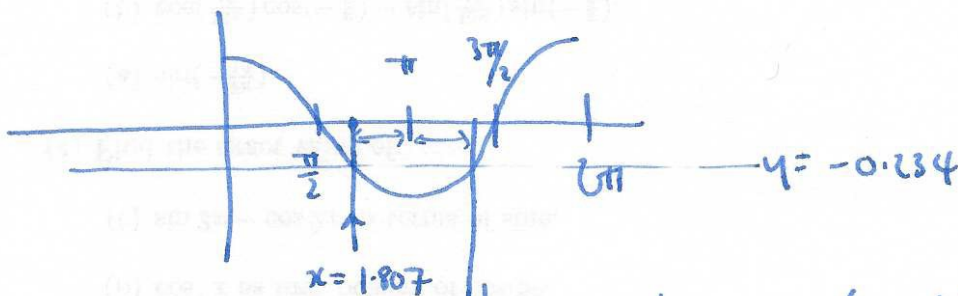
$$\left(-\pi + \frac{\pi}{6} = -\frac{5\pi}{6}\right)$$

all solutions:

$$-\frac{\pi}{6} + 2\pi n \quad n \in \mathbb{Z}$$

$$-\frac{5\pi}{6} + 2\pi n \quad n \in \mathbb{Z}$$

$$b) \cos x = -0.234 \quad x = \cos^{-1}(-0.234) = 1.907$$



all solutions

$$1.907 + 2\pi n, \quad n \in \mathbb{Z}$$

$$-1.907 + 2\pi n, \quad n \in \mathbb{Z}$$

$$\text{by symmetry: } \pi + (\pi - 1.907) = 2\pi - 1.907$$

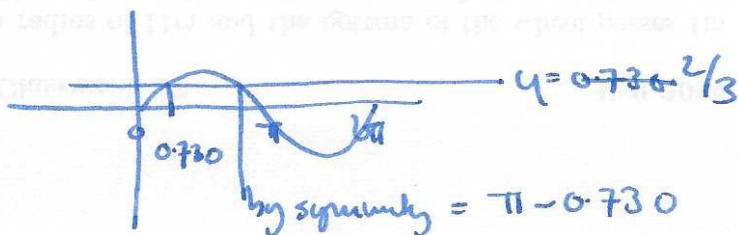
$$c) 6 \sin^2 x - \sin x - 2 = 0$$

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

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

$$\sin x = -\frac{1}{2} \quad (a) : x = -\frac{\pi}{6} + 2\pi n, \quad -\frac{5\pi}{6} + 2\pi n$$

$$x = \sin^{-1}\left(\frac{2}{3}\right) = 0.730$$



so:

$$x = 0.730 + 2\pi n, \quad n \in \mathbb{Z}$$

$$x = \pi - 0.730 + 2\pi n, \quad n \in \mathbb{Z}$$

$$\text{by symmetry} = \pi - 0.730$$

Q6 d)

$$\cos x - 6\sin^2 x = -5$$

$$\cos x - 6(1 - \cos^2 x) = -5$$

$$\cos x - 6 + 6\cos^2 x + 5 = 0$$

$$6\cos^2 x + \cos x - 1 = 0$$

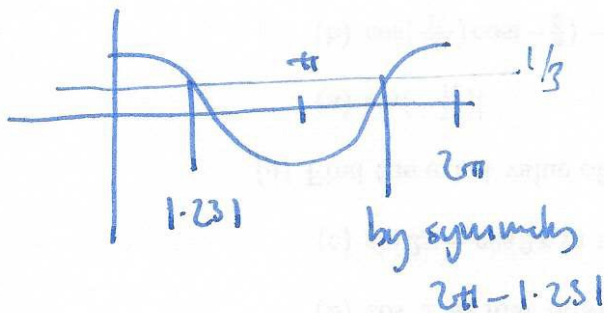
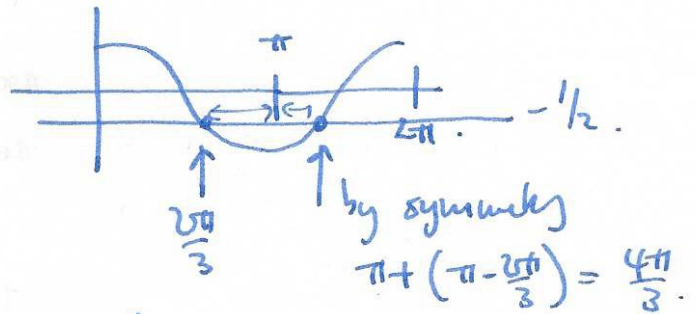
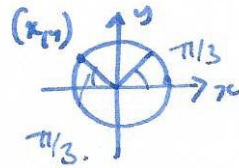
$$(3\cos x - 1)(2\cos x + 1) = 0$$

$$\cos x = 1/3$$

$$x = \cos^{-1}(1/3) = 1.231$$

$$\cos x = -1/2$$

$$x = \pi - \pi/3 = 2\pi/3$$



sols

$$\frac{2\pi}{3} + 2\pi n \quad n \in \mathbb{Z}$$

$$\frac{4\pi}{3} + 2\pi n$$

all solutions: $1.231 + 2\pi n$
 $-1.231 + 2\pi n \quad n \in \mathbb{Z}$

e) $\sin x + \cos x = 1$ ~~or~~ $\sin(A+B) = \sin A \cos B + \cos A \sin B$

$$A \sin(x+B) = A \sin x \cos B + A \cos x \sin B$$

want: $A \cos B = 1$ } $\tan B = 1 \Rightarrow B = \pi/4$
 $A \sin B = 1$

$$A^2 \cos^2 B + A^2 \sin^2 B = 2$$

$$A^2 = 2 \quad A = \sqrt{2}$$

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

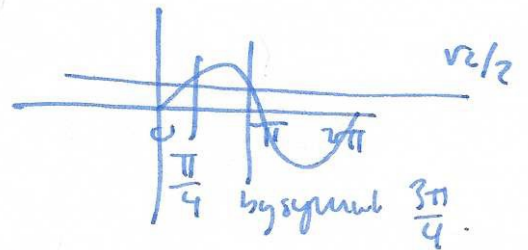
$$\sin\left(x + \frac{\pi}{4}\right) = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

2A $\frac{\pi}{4}$

$$x + \frac{\pi}{4} = \frac{\pi}{4} \Rightarrow x = 0 + 2\pi n$$

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

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



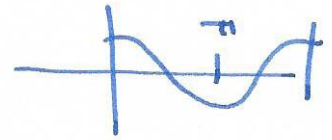
f) $\cos 2x + \cos 3x = 0$

u(x): $\cos(A+B) + \cos(A-B) = 2\cos A \cos B$ (Q46)

$$\left. \begin{aligned} A+B &= 2x \\ A-B &= 3x \end{aligned} \right\}$$

$$\left. \begin{aligned} 2A &= 5x & A &= \frac{5}{2}x \\ 2B &= -x & B &= -\frac{1}{2}x \end{aligned} \right\}$$

$$2\cos\left(\frac{5}{2}x\right)\cos\left(-\frac{1}{2}x\right) = 0$$



$\cos(x) = 0$ so $x = \frac{\pi}{2} + 2\pi n$
 $\frac{3\pi}{2} + 2\pi n$ $n \in \mathbb{Z}$

so $x = \frac{2}{5}\left(\frac{\pi}{2} + 2\pi n\right), \frac{2}{5}\left(\frac{3\pi}{2} + 2\pi n\right)$

and $x = -2\left(\frac{\pi}{2} + 2\pi n\right), -2\left(\frac{3\pi}{2} + 2\pi n\right)$ $n \in \mathbb{Z}$