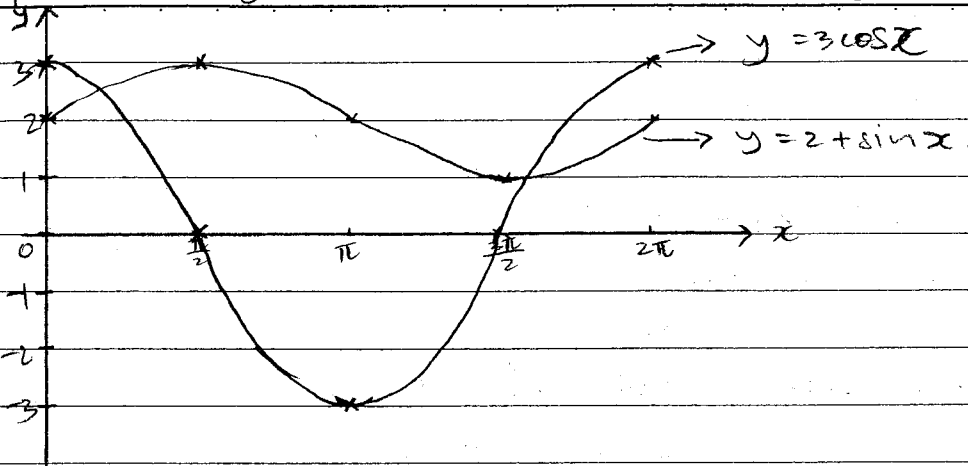


Chap. 10 & 11 (Trigonometric Function & identities)

Date

No.

8.



06 JAN 2005

06 JAN 2005

E CHUA

$$|2 + \sin x - 3\cos x| = \frac{1}{2}$$

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

or

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

$$2 + \sin x = 3\cos x + \frac{1}{2}$$

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

No. of solutions = 4

10. $\sec^2 x + \operatorname{cosec}^2 x \equiv \sec^2 x \operatorname{cosec}^2 x$

$$\sec^2 x + \operatorname{cosec}^2 x = (1 + \tan^2 x) + (1 + \cot^2 x)$$

$$= 1 + \tan^2 x + 1 + \cot^2 x$$

$$= 1 + \cot^2 x + \tan^2 x + \frac{\tan^2 x}{\tan^2 x}$$

$$= 1 + \cot^2 x + \tan^2 x + \tan^2 x \cot^2 x$$

$$= (1 + \tan^2 x)(1 + \cot^2 x)$$

$$= \sec^2 x \operatorname{cosec}^2 x \quad \# \text{ (proven)}$$

34. (i) $5(\sin x - \cos x) = 4\sin x - 3\cos x$

$$5\sin x - 5\cos x = 4\sin x - 3\cos x$$

$$\sin x = 2\cos x$$

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

$$\tan x = 2$$

$$\begin{array}{c} s \\ \hline \tan x = 2 \end{array}$$

$$\text{basic angle} = 63.4^\circ$$

$$x = 63.4^\circ, 243.4^\circ \quad \#$$



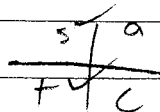
(ii) $2 \tan^2 y + 3 \sec y = 0$
 $2(\sec^2 y - 1) + 3 \sec y = 0$
 $2 \sec^2 y + 3 \sec y - 2 = 0$
 $(2 \sec y - 1)(\sec y + 2) = 0$

$2 \sec y = 1$ or $\sec y = -2$

$\sec y = \frac{1}{2}$ $\cos y = -\frac{1}{2}$

$\cos y = 2$ (n.a.) basic angle = 60°

$y = 120^\circ, 240^\circ$ #



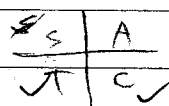
(iii) $\sin(2z + 32^\circ) = -\sin 72^\circ$

basic angle = 72°

$2z + 32^\circ = 252^\circ, 288^\circ, 612^\circ, 648^\circ$

$2z = 220^\circ, 256^\circ, 580^\circ, 616^\circ$

$z = 110^\circ, 128^\circ, 290^\circ, 308^\circ$ #



56. a. (i) $2 \sin 2x + 1 = 0$

$2 \sin 2x = -1$

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

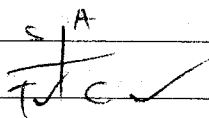
$0^\circ < x < 360^\circ$

$0^\circ < 2x < 720^\circ$

basic angle = 30°

$2x = 210^\circ, 330^\circ, 570^\circ, 690^\circ$

$x = 105^\circ, 165^\circ, 285^\circ, 345^\circ$ #



(ii) $2 \tan^2 y = 5 \sec y + 1$

$2(\sec^2 y - 1) - 5 \sec y - 1 = 0$

$2 \sec^2 y - 2 - 5 \sec y - 1 = 0$

$2 \sec^2 y - 5 \sec y - 3 = 0$

$(2 \sec y + 1)(\sec y - 3) = 0$

$2 \sec y = -1$

$\sec y = -\frac{1}{2}$

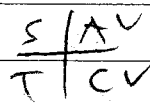
$\cos y = -2$ (n.a.)

or $\sec y = 3$

$\cos y = \frac{1}{3}$

basic angle = 70.5°

$y = 70.5^\circ, 289.5^\circ$ #



$$(ii) \sec y (1 + \tan y) = 6 \operatorname{cosec} y$$

$$1 + \tan y = \frac{6}{\sin y} \div \frac{1}{\cos y} \rightarrow \frac{1}{\cos y} (1 + \frac{\sin y}{\cos y}) = \frac{6}{\sin y}$$

$$1 + \tan y = \frac{6 \cos y}{\sin y} \quad 1 + \frac{\sin y}{\cos y} = \frac{6 \cos y}{\sin y}$$

$$1 + \tan y = 6 \cot y$$

$$\cos y \sin y + \sin^2 y = 6 \cos^2 y$$

$$\tan y + \tan^2 y = 6$$

$$\sin^2 y + \cos y \sin y - 6 \cos^2 y = 0$$

$$\tan^2 y + \tan y - 6 = 0$$

$$(\sin y + 3 \cos y)(\sin y - 2 \cos y) = 0$$

$$(\tan y + 3)(\tan y - 2) = 0$$

$$\tan y = -3 \quad \text{or} \quad \tan y = 2$$

$$\tan y = 2$$

$$\text{basic angle} = 71.6^\circ$$

$$\text{basic angle} = 63.4^\circ$$

$$y = 108.4^\circ, 288.4^\circ$$

$$y = 63.4^\circ, 243.4^\circ$$

$$y = 63.4^\circ, 108.4^\circ, 243.4^\circ, 288.4^\circ \#$$

$$b. \cos\left(\frac{\pi t}{5}\right) = 0.6$$

$$\text{basic angle} = 0.92730$$

$$\frac{\pi t}{5} = 0.92730, 5.3560$$

$$\pi t = 4.6365, 26.780$$

$$t = 1.48, 8.52 \text{ (3 sf)} \#$$

$$\rightarrow 0 < \frac{\pi t}{5} < 2\pi$$

$$\frac{\pi t}{5} = 0.9273, 2\pi - 0.9273$$

$$t = 1.48, 8.52 \text{ (3 sf)}$$

$$68a. (i) 8 \sin^2 x = 7 - 2 \cos x$$

$$8(1 - \cos^2 x) = 7 - 2 \cos x$$

$$8 - 8 \cos^2 x = 7 - 2 \cos x$$

$$8 \cos^2 x - 2 \cos x - 1 = 0$$

$$(4 \cos x + 1)(2 \cos x - 1) = 0$$

$$4 \cos x = -1$$

$$\cos x = -\frac{1}{4}$$

$$\text{basic angle} = 75.5^\circ$$

$$x = 104.5^\circ, 255.5^\circ$$

$$x = 60^\circ, 104.5^\circ, 255.5^\circ, 300^\circ \#$$

or

$$2 \cos x = 1$$

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

$$\text{basic angle} = 60^\circ$$

$$x = 60^\circ, 300^\circ$$

$$(ii) 4 \sin \frac{1}{2}y \cos y = 3 \cos y$$

$$4 \sin \frac{1}{2}y \cos y - 3 \cos y = 0$$

$$\cos y (4 \sin \frac{1}{2}y - 3) = 0$$

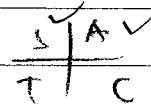
$$\cos y = 0$$

$$y = 90^\circ, 270^\circ$$

or

$$4 \sin \frac{1}{2}y = 3$$

$$\sin \frac{1}{2}y = \frac{3}{4}$$



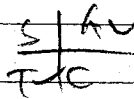
$$\text{basic angle} = 48.6^\circ$$

$$\frac{1}{2}y = 48.6^\circ, 131.4^\circ$$

$$y = 97.2^\circ, 262.8^\circ$$

$$y = 90^\circ, 97.2^\circ, 262.8^\circ, 270^\circ$$

$$b. \tan(2z - 0.2) = 1.2$$



$$\text{basic angle} = 0.87606$$

$$2z - 0.2 = 0.87606, 4.0177$$

$$2z = 1.07606, 4.2177$$

$$z = 0.538, 2.11 \#$$