TRIGONOMETRIC EQUATIONS

4) a) $3\sin^2\theta - 2\cos^2\theta = 1$

$3\sin^2\theta - 2(1-\sin^2\theta) = 1$

$3\sin^2\theta - 2 + 2\sin^2\theta = 1$

$5\sin^2\theta = 1 + 2$

$5\sin^2\theta = 3$

---

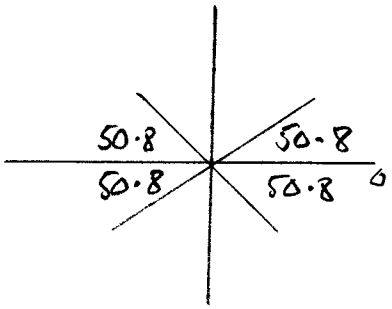
b) $3\sin^2\theta - 2\cos^2\theta = 1$

$\Rightarrow \quad 5\sin^2\theta = 3$

$\Rightarrow \quad \sin^2\theta = \frac{3}{5}$

$\Rightarrow \quad \sin\theta = \pm\sqrt{\frac{3}{5}}$

$\sin^{-1}\sqrt{\frac{3}{5}} = 50.8^\circ$



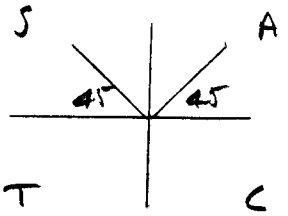
$\theta = 50.8^\circ, 129.2^\circ, 230.8^\circ, 309.2^\circ$

TRIGONOMETRIC EQUATIONS

9)

a) $\sin(x-20^\circ) = \frac{1}{\sqrt{2}}$

$\sin^{-1}\frac{1}{\sqrt{2}} = 45^\circ$



$x - 20^\circ = 45^\circ, 135^\circ$

$x = 45^\circ + 20^\circ, 135^\circ + 20^\circ$

$x = 65^\circ, 155^\circ$

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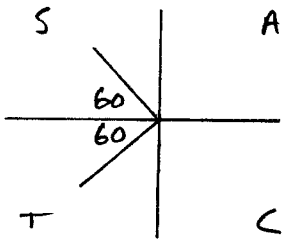
b) $\cos 3x = -\frac{1}{2}$

$\cos^{-1}\frac{1}{2} = 60^\circ$



$3x = 120^\circ, 240^\circ, 120^\circ+360^\circ, 240^\circ+360^\circ, 120^\circ+720^\circ, 240^\circ+720^\circ$

$3x = 120^\circ, 240^\circ, 480^\circ, 600^\circ, 840^\circ, 960^\circ$

$x = 40^\circ, 80^\circ, 160^\circ, 200^\circ, 280^\circ, 320^\circ$

TRIGONOMETRIC EQUATIONS

8) a) $4\sin^2 x + 9\cos x - 6 = 0$

$4(1-\cos^2 x) + 9\cos x - 6 = 0$

$4 - 4\cos^2 x + 9\cos x - 6 = 0$

$0 = 4\cos^2 x - 9\cos x + 6 - 4$

$0 = 4\cos^2 x - 9\cos x + 2$

---

b) Solve for $0 \leq x \leq 720°$

$4\sin^2 x + 9\cos x - 6 = 0$

$\Rightarrow \quad 4\cos^2 x - 9\cos x + 2 = 0$

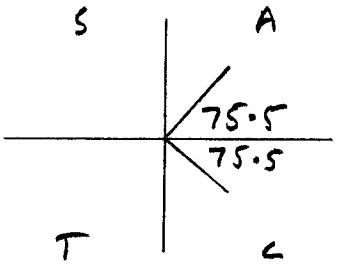
$(4\cos x - 1)(\cos x - 2) = 0$

$\Rightarrow \quad 4\cos x - 1 = 0$ since $\cos x \neq 2$

$4\cos x = 1$

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

$\cos^{-1}\frac{1}{4} = 75.5°$



$x = 75.5°, \ 284.5°, \ 75.5° + 360°, \ 284.5° + 360°$

$x = 75.5°, \ 284.5°, \ 435.5°, \ 644.5°$

TRIGONOMETRIC EQUATIONS

7) i) Solve for $-180^\circ \leq \theta < 180^\circ$

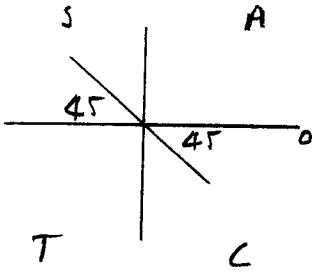
$$(1+\tan\theta)(5\sin\theta - 2) = 0$$

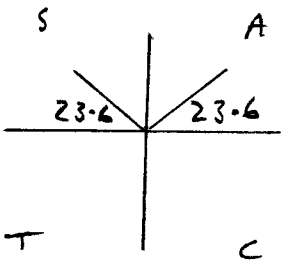
$\Rightarrow \quad 1+\tan\theta = 0 \quad$ or $\quad 5\sin\theta - 2 = 0$

$\tan\theta = -1 \qquad 5\sin\theta = 2$

$\sin\theta = \frac{2}{5}$

$\tan^{-1} 1 = 45^\circ \qquad \sin^{-1}\frac{2}{5} = 23.6^\circ$





$\theta = -45^\circ, 135^\circ \qquad \theta = 23.6^\circ, \ 156.4^\circ$

---

ii) Solve for $0^\circ \leq x < 360^\circ$

$$4\sin x = 3\tan x$$

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

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

$$4\sin x\cos x - 3\sin x = 0$$

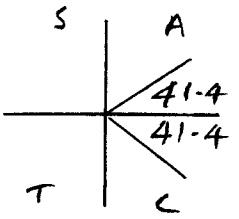
$$\sin x(4\cos x - 3) = 0$$

$\Rightarrow \sin x = 0$ or $4\cos x - 3 = 0$

$4\cos x = 3$

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

$\cos^{-1}\frac{3}{4} = 41.4^\circ$



$x = 0^\circ, 180^\circ, 360^\circ \qquad x = 41.4^\circ, 318.6^\circ$

$$x = 0^\circ, 180^\circ, 41.4^\circ, 318.6^\circ$$

TRIGONOMETRIC EQUATIONS

2) a) $5\sin x = 1 + 2\cos^2 x$

$5\sin x = 1 + 2(1 - \sin^2 x)$

$5\sin x = 1 + 2 - 2\sin^2 x$

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

---

b) Solve for $0 \leq x < 360°$

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

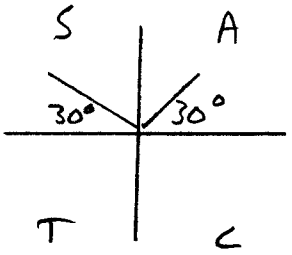
$(2\sin x - 1)(\sin x + 3) = 0$

$\Rightarrow \quad 2\sin x - 1 = 0$ since $\sin x \neq -3$

$2\sin x = 1$

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

$\sin^{-1}\frac{1}{2} = 30°$



$x = 30°, 150°$

TRIGONOMETRIC EQUATIONS

5) a) $5\sin\theta = 2\cos\theta$

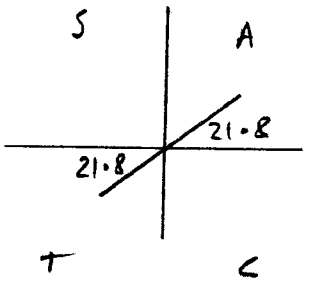
$$\frac{\sin\theta}{\cos\theta} = \frac{2}{5}$$

$$\tan\theta = \frac{2}{5}$$

---

b) $5\sin 2x = 2\cos 2x$ Solve for $0 \leq x < 360^\circ$

$\Rightarrow \quad \tan 2x = \frac{2}{5}$ $\quad \tan^{-1}\frac{2}{5} = 21.8^\circ$



$2x = 21.8^\circ, 201.8^\circ, 21.8^\circ + 360^\circ, 201.8^\circ + 360^\circ$

$2x = 21.8^\circ, 201.8^\circ, 381.8^\circ, 561.8^\circ$

$x = 10.9^\circ, 100.9^\circ, 190.9^\circ, 280.9^\circ$
