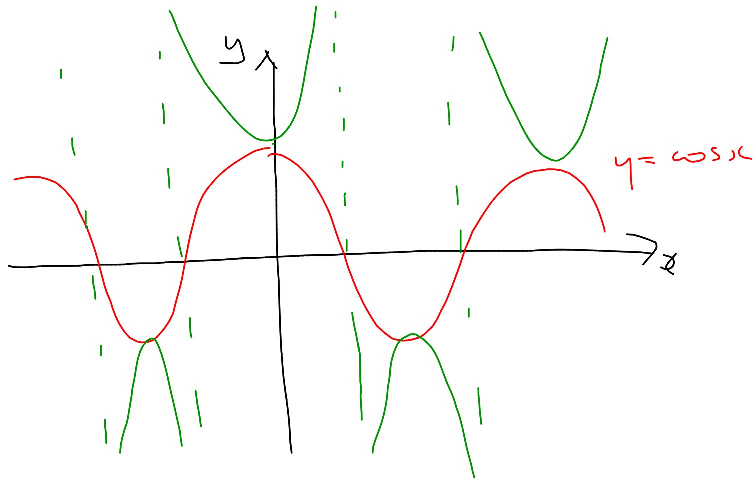
6d)

$\sec 3x = 0$

no solutions



8b)

$$\sqrt{3}\sin\theta + \cos\theta = 0$$

$$\sqrt{3}\sin\theta = -\cos\theta$$

$$\frac{\sin\theta}{\cos\theta} = -\frac{1}{\sqrt{3}}$$

$$\tan\theta = -\frac{1}{\sqrt{3}}$$

8d)

$$\sec\theta - 2\cos\theta = 0$$

$$\frac{1}{\cos\theta} - 2\cos\theta = 0$$

$$2\cos^2\theta - 1 = 0$$

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

$$\cos\theta = \pm\frac{1}{\sqrt{2}}$$

Q1, 2, 3, 4

$$\cos\alpha = \frac{1}{\sqrt{2}}$$

$$\alpha = 45^\circ$$

$$\theta = 45^\circ, 135^\circ, 225^\circ, 315^\circ$$

9c)

$$2\sin\theta\cos\theta = \sin\theta$$

$$2\sin\theta\cos\theta - \sin\theta = 0$$

$$\sin\theta(2\cos\theta - 1) = 0$$

$\sin\theta = 0$ or $\cos\theta = \frac{1}{2}$

9e) $2\sin^2\theta - \sin\theta = 1$ $\qquad 0 \leq \theta \leq 360$

$2\sin^2\theta - \sin\theta - 1 = 0$

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

$\sin\theta = -\frac{1}{2}$ or $\sin\theta = 1$

Q 3, 4 $\qquad \theta = 90^\circ$

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

$\alpha = 30^\circ$

$\theta = 210^\circ, 330^\circ$

$\underline{\theta = 90^\circ, 210^\circ, 330^\circ}$

9g)

$$3\cos^2\theta + 5\cos\theta = 2$$

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

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

$\cos\theta = \frac{1}{3}$ or $\cos\theta = -2$
no solutions

Q1, 4

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

$\alpha = 70^\circ 32'$

$\therefore \theta = 70^\circ 32', 289^\circ 28'$

10a) $2\sin^2 x + \cos x = 2$

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

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

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

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

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

10d) $6\tan^2\alpha = 5\sec\alpha$

$6\sec^2\alpha - 6 = 5\sec\alpha$

$6\sec^2\alpha - 5\sec\alpha - 6 = 0$

$(3\sec\alpha + 2)(2\sec\alpha - 3) = 0$

$\sec\alpha = -\frac{2}{3}$ or $\sec\alpha = \frac{3}{2}$

no solutions.

$\cos\alpha = \frac{2}{3}$

10e) $6\operatorname{cosec}^2 x = \cot x + 8$ $\quad 0 \le x \le 360$

$6\operatorname{cosec}^2 x - \cot x - 8 = 0$

$6 + 6\cot^2 x - \cot x - 8 = 0$

$6\cot^2 x - \cot x - 2 = 0$

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

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

$\tan x = \frac{3}{2}$ $\quad \tan x = -2$

Q1, 3 $\quad$ Q2, 4

$\tan\alpha = \frac{3}{2}$ $\quad \tan\alpha = 2$

$\alpha = 56°19'$ $\quad \alpha = 63°26'$

$x = 56°19', 236°19'$ $\quad x = 116°34', 296°34'$

$\underline{x = 56°19', 116°34', 236°19', 296°34'}$

12a)

$\cot A + 4\tan A = 4\operatorname{cosec} A \qquad 0 \le A \le 360$

$\frac{\cos A}{\sin A} + \frac{4\sin A}{\cos A} = \frac{4}{\sin A}$

$\cos^2 A + 4\sin^2 A = 4\cos A$

$\cos^2 A + 4 - 4\cos^2 A = 4\cos A$

$3\cos^2 A + 4\cos A - 4 = 0$

$(3\cos A - 2)(\cos A + 2) = 0$

$\cos A = \frac{2}{3}$ or $\cos A = -2$

Q1, 4 no solutions

$\cos\alpha = \frac{2}{3}$

$\alpha = 48°11'$

$A = 48°11', 311°49'$

12b)

$$3(\tan A + \sec A) = 2\cot A$$

$$\frac{3\sin A}{\cos A} + \frac{3}{\cos A} = \frac{2\cos A}{\sin A}$$

$$3\sin^2 A + 3\sin A = 2\cos^2 A$$

$$= 2 - 2\sin^2 A$$

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

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

$$\sin A = \frac{2}{5} \quad \text{or} \quad \sin A = -1$$

$$A = 270^\circ$$

not a solution

13b)

$$6\sin x\cos x + 3\sin x = 2\cos x + 1$$

$$3\sin x(2\cos x + 1) = 2\cos x + 1$$

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

$$\cos x = -\frac{1}{2} \quad \text{or} \quad \sin x = \frac{1}{3}$$

14d) $\sin^3 x + 2\sin^2 x\cos x + \sin x\cos^2 x = 0$

$\sin x\left(\sin^2 x + 2\sin x\cos x + \cos^2 x\right) = 0$

$\sin x\left(\sin x + \cos x\right)^2 = 0$

$\sin x = 0$ or $\sin x = -\cos x$

$x = 0^\circ, 180^\circ, 360^\circ$

$\tan x = -1$

Q2, 4

$\tan \alpha = 1$

$\alpha = 45^\circ$

$x = 135^\circ, 315^\circ$

$\underline{x = 0^\circ, 135^\circ, 180^\circ, 315^\circ, 360^\circ}$

15a) $4\cos^2\theta + 2\sin\theta = 3$

$4 - 4\sin^2\theta + 2\sin\theta = 3$

$4\sin^2\theta - 2\sin\theta - 1 = 0$

$\sin\theta = \dfrac{2 \pm \sqrt{20}}{8}$

$= \dfrac{1 \pm \sqrt{5}}{4}$

$\sin\theta = \dfrac{1+\sqrt{5}}{4}$ or $\sin\theta = \dfrac{1-\sqrt{5}}{4}$

Q1, 2 | Q3, 4

$\sin\alpha = \dfrac{1+\sqrt{5}}{4}$ | $\sin\alpha = \dfrac{\sqrt{5}-1}{4}$

$\alpha \doteq 54^\circ$ | $\alpha = 18^\circ$

$\theta = 54^\circ, 126^\circ$ | $\theta = 198^\circ, 342^\circ$

$$\underline{\theta = 54^\circ, 126^\circ, 198^\circ, 342^\circ}$$

15g) $20\cot\theta + 15\cot\theta\operatorname{cosec}\theta - 4\operatorname{cosec}\theta = 3(1+\cot^2\theta)$

$$\frac{20\cos\theta}{\sin\theta} + \frac{15\cos\theta}{\sin\theta} \times \frac{1}{\sin\theta} - \frac{4}{\sin\theta} = 3\left(1 + \frac{\cos^2\theta}{\sin^2\theta}\right)$$

$$20\sin\theta\cos\theta + 15\cos\theta - 4\sin\theta = 3(\sin^2\theta + \cos^2\theta)$$

$$20\sin\theta\cos\theta + 15\cos\theta - 4\sin\theta - 3 = 0$$

$$5\cos\theta(4\sin\theta + 3) - (4\sin\theta + 3) = 0$$

$$(4\sin\theta + 3)(5\cos\theta - 1) = 0$$

$\sin\theta = -\frac{3}{4}$ or $\cos\theta = \frac{1}{5}$

Q3, 4   Q1, 4

$\sin\alpha = \frac{3}{4}$ $\cos\alpha = \frac{1}{5}$

$\alpha = 48°35'$ $\alpha = 78°28'$

$\theta = 228°35', 311°25'$ $\theta = 78°28', 281°32'$

$$\underline{\theta = 78°28', 228°35', 281°32', 311°25'}$$

15i)

$$(\sqrt{3}+1)\cos^2\theta - 1 = (\sqrt{3}-1)\sin\theta\cos\theta$$

$$\sqrt{3}\cos^2\theta + \cos^2\theta - 1 = (\sqrt{3}-1)\sin\theta\cos\theta$$

$$\sqrt{3}\cos^2\theta - \sin^2\theta = (\sqrt{3}-1)\sin\theta\cos\theta$$

$$\sqrt{3}\cos^2\theta + (1-\sqrt{3})\sin\theta\cos\theta - \sin^2\theta = 0$$

$$(\sqrt{3}\cos\theta + \sin\theta)(\cos\theta - \sin\theta) = 0$$

$$\sqrt{3}\cos\theta = -\sin\theta \qquad \cos\theta = \sin\theta$$

$$\tan\theta = -\sqrt{3} \qquad \tan\theta = 1$$