

Solve the following trig equations. You must sketch the graphs of the relevant functions indicating the solutions.

No Calculator Questions:

1.  $4\cos^2 x - 3 = 0$ ,  $0 \leq x \leq 2\pi$ , given that  $\cos\left(\frac{\pi}{6}\right) = \frac{\sqrt{3}}{2}$
2.  $\sin 2\beta = 0$ ,  $-2\pi \leq \beta \leq 2\pi$
3.  $\cos^2 2x - 1 = 0$ ,  $-\pi \leq x \leq \pi$
4.  $\frac{1}{\tan x} = 0$ ,  $-2\pi \leq x \leq 2\pi$
5.  $\sin 4\theta + 1 = 0$ ,  $-\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$
6.  $3\sin^2 x + 1 = 4\sin x$ ,  $0 \leq x \leq 2\pi$ , given that  $\sin(0.340) \approx \frac{1}{3}$
7.  $\tan^2 x = -\tan x$ ,  $-2\pi \leq x \leq 2\pi$ , given that  $\tan\left(\frac{\pi}{4}\right) = 1$

Note: Questions 8 - 12 require a substitution

8.  $\sqrt{2}\sin 2\theta = -2\cos \theta$ ,  $0 \leq \theta \leq 2\pi$ , given that  $\sin\left(\frac{\pi}{4}\right) = \frac{1}{\sqrt{2}}$
9.  $2 - \sin^2 x + 2\cos x = 0$ ,  $-\pi \leq x \leq \pi$
10.  $\cos 2\beta = 2\sin^2 \beta$ ,  $-\pi \leq \beta \leq \pi$ , given that  $\sin\left(\frac{\pi}{6}\right) = \frac{1}{2}$
11.  $\sin^2 x - 3\cos^2 x = 0$ ,  $0 \leq x \leq 2\pi$ , given that  $\tan\left(\frac{\pi}{3}\right) = \sqrt{3}$
12.  $\cos 2x + 3\cos x = -1$ ,  $-2\pi \leq x \leq 0$

Calculator Questions – Answers to three significant figures

13.  $5\sin \theta + 4 = 0$ ,  $-\pi \leq \theta \leq \pi$
14.  $\tan \theta = 6$ ,  $0 \leq \theta \leq 2\pi$
15.  $3\sin 3\theta = 8\cos \theta$ ,  $-1.6 \leq \theta \leq 3$
16.  $2\cos x - 5\sin^2 x = 2\tan\left(\frac{1}{2}x\right)$ ,  $-8 \leq x \leq 0$

Answers:

1.  $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$     2.  $0, \pm\frac{\pi}{2}, \pm\pi, \pm\frac{3\pi}{2}, \pm 2\pi$     3.  $0, \pm\frac{\pi}{2}, \pm\pi$

4.  $\pm\frac{\pi}{2}, \pm\frac{3\pi}{2}$     5.  $\frac{-\pi}{8}, \frac{3\pi}{8}$     6.  $0.340, \pi - 0.340, \frac{\pi}{2}$

7.  $0, \pm\pi, \pm 2\pi, \frac{-5\pi}{4}, \frac{-\pi}{4}, \frac{3\pi}{4}, \frac{7\pi}{4}$     8.  $\frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{4}, \frac{7\pi}{4}$     9.  $\pm\pi$

10.  $\pm\frac{\pi}{6}, \pm\frac{5\pi}{6}$     11.  $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$     12.  $\frac{-\pi}{2}, \frac{-3\pi}{2}$

13.  $-2.21, -0.927$     14.  $1.41, 4.55$     15.  $-1.31, 1.84$

16.  $-7.02, -5.77, -2.26, -0.736$