PreCalc Honors Entrance Slip Name: Key

Solve each of the following. Watch the bounded vs. unbounded.

1. $4\cos x = 1 + 2\cos x, \quad [0, 2\pi)$

$2\cos x = 1$

$\cos x = 1/2$

$\boxed{x = \pi/3, 5\pi/3}$

2. $4\tan^2 x - 1 = \tan^2 x$

$3\tan^2 x = 1$

$\tan^2 x = \frac{1}{3}$

$\tan x = \pm \frac{\sqrt{3}}{3}$

$x = \pi/6, 5\pi/6, 7\pi/6, 11\pi/6$

$x = \pi/6 + \pi n$
$x = 5\pi/6 + \pi n$ $\Big\} n \in \mathbb{Z}$

3. $\sin^2 x + 2\cos x = 2, \quad [0, 2\pi)$

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

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

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

$\cos x = 1$

$\boxed{x = 0}$

4. $4\sin 2x \cos^2 2x = \sin 2x$

$4\sin 2x \cos^2 2x - \sin 2x = 0$

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

$\sin 2x = 0$

$2x = 0 + \pi n$

$= \not{\pi}$

$\boxed{x = \frac{\pi}{2} n, n \in \mathbb{Z}}$

$\cos^2 2x = \frac{1}{4}$

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

$2x = \pi/3 + \pi n$

$2\pi/3 + \pi n$

$x = \pi/6 + \pi/2\, n$
$= \pi/3 + \pi/2\, n$ $\Big\} n \in$

or

$x = \frac{\pi}{6} n, n \in \mathbb{Z}$

5. $\cos\left(x - \frac{\pi}{3}\right) - \cos\left(x + \frac{\pi}{3}\right) = 1, \quad [0, 2\pi)$

$\cos x \cos\frac{\pi}{3} + \sin x \sin\frac{\pi}{3} - \left(\cos x \cos\frac{\pi}{3} - \sin x \sin\frac{\pi}{3}\right) = 1$

$2\sin x \sin\frac{\pi}{3} = 1$

$2\sin x (\sqrt{3}/2) = 1$

$\sqrt{3}\sin x = 1$

$\sin x = \sqrt{3}/3$

$x = .615\ldots$

$\boxed{x = .615, 2.526}$