NAME Key PRECAL WS#2

Solutions $[0, 2\pi)$

1) $\csc^2 x = 2$

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

$\sin x = \pm \frac{1}{\sqrt{2}}$ or $\pm \frac{\sqrt{2}}{2}$

$x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

2) $\sin^2 2x - 1 = 0$

$\sin^2 2x = 1$

$\sin 2x = \pm 1$

$2x = \frac{\pi}{2} + 2\pi$ $\quad 2x = \frac{3\pi}{2} + 2\pi$

$x = \frac{\pi}{4} + \pi$ $\quad x = \frac{3\pi}{4} + \pi$

$\frac{5\pi}{4}$ $\quad \frac{7\pi}{4}$

$x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

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

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

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

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

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

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

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

$x = \frac{\pi}{6}, \frac{5\pi}{6}$ $\quad x = \frac{3\pi}{2}$

4) $\cos^2 x = 2 - \cos x$

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

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

$\cos x = -2$ $\quad \cos x = 1$

$\downarrow$ $\quad x = 0$

$\varnothing$

5) $3\tan^2 x - \sec^2 x - 5 = 0$

$3\tan^2 x - (1 + \tan^2 x) - 5 = 0$

$3\tan^2 x - 1 - \tan^2 x - 5 = 0$

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

$2\tan^2 x = 6$

$\tan^2 x = 3$

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

$x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$

6) $2\cos^2 3x - 1 = 0$

$2\cos^2(3x) = 1$

$\cos^2(3x) = \frac{1}{2}$

$\cos(3x) = \pm \frac{1}{\sqrt{2}}$ or $\pm \frac{\sqrt{2}}{2}$

$3x = \frac{\pi}{4} + 2\pi$ $\quad 3x = \frac{3\pi}{4} + 2\pi$ $\quad 3x = \frac{5\pi}{4} + 2\pi$ $\quad 3x = \frac{7\pi}{4} + 2\pi$

$x = \frac{\pi}{12} + \frac{2\pi}{3}$ $\frac{9\pi}{12}$ $\quad x = \frac{\pi}{4} + \frac{2\pi}{3}$ $\frac{3\pi}{12}$ $\quad x = \frac{5\pi}{12} + \frac{2\pi}{3}$ $\quad x = \frac{7\pi}{12} + \frac{2\pi}{3}$

$\frac{9\pi}{12}$ $\quad \frac{11\pi}{12}$ $\quad \frac{13\pi}{12}$ $\quad \frac{15\pi}{12}$

$\frac{17\pi}{12}$ $\quad \frac{19\pi}{12}$ $\quad \frac{21\pi}{12}$ $\quad \frac{23\pi}{12}$