Solving Trig Equations

Sec 5.3 part 2 pg # 400 # 17-18, 21-24

#17) $2\sin^2 2x = 1$

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

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

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

Period is 4π b/c

$2x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}, \frac{9\pi}{4}, \frac{11\pi}{4}, \frac{13\pi}{4}, \frac{15\pi}{4}$

$x = \frac{\pi}{8}, \frac{3\pi}{8}, \frac{5\pi}{8}, \frac{7\pi}{8}, \frac{9\pi}{8}, \frac{11\pi}{8}, \frac{13\pi}{8}, \frac{15\pi}{8}$

#18) $\tan^2 3x = 3$

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

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

b/c Period is 3π

$x = \frac{\pi}{9}, \frac{4\pi}{9}, \frac{7\pi}{9}$

#21) $\sin^2 x = 3\cos^2 x$

Identity sec5-1: $\cos^2 x = 1 - \sin^2 x$

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

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

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

$4\sin^2 x - 3 = 0$

$4\sin^2 x = 3$

$\sqrt{\sin^2 x} = \sqrt{3/4}$

$\sin x = \pm\frac{\sqrt{3}}{2}$

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

#22) $\tan 3x(\tan x - 1) = 0$

$\tan 3x = 0$ & $\tan x - 1 = 0$

$3x = 0, \pi$ $\quad$ $\tan x = 1$

$x = 0, \frac{\pi}{3}$ $\quad$ $x = \frac{\pi}{4}, \frac{5\pi}{4}$

#23) $(3\tan^2 x - 1)(\tan^2 x - 3) = 0$

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

$3\tan^2 x = 1$ $\quad$ $\tan^2 x = 3$

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

$\tan x = \pm\frac{1}{\sqrt{3}}$

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

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

$x = \pi/6, 7\pi/4$ or $x = 5\pi/6, 11\pi/6$

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

$\cos 2x = 0$ & $2\cos x + 1 = 0$

$2x = \frac{\pi}{2}, \frac{3\pi}{2}$ $\quad$ $\cos x = -\frac{1}{2}$

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