5.3 Solving Trig Equations Practice Worksheet #1
Pre-calculus

Name: _____
Date: _____ Block: ____

Solve for the unknown variable on the interval $0 \le x < 2\pi$.

1. $4\cos^2 x - 3 = 0$

$\cos^2 x = \frac{3}{4}$

$\cos x = \pm\sqrt{\frac{3}{4}} = \pm\frac{\sqrt{3}}{2}$

$\cos x = \frac{\sqrt{3}}{2}$ $\quad \cos x = \frac{-\sqrt{3}}{2}$

$x = \frac{\pi}{6}, \frac{11\pi}{6}$ $\quad x = \frac{5\pi}{6}, \frac{7\pi}{6}$

2. $\sqrt{2}\sin 2x = 1$

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

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

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

$\sin x\cos x = \frac{\sqrt{2}}{4}$

Let $u = 2x$

$\sin u = \frac{\sqrt{2}}{2}$

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

$2x = \frac{\pi}{4}$ $\quad x = \frac{\pi}{8}$ $\quad 2x = \frac{3\pi}{4}$ $\quad x = \frac{3\pi}{8}$

3. $3\cot^2 x - 1 = 0$

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

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

$\cot x = \frac{\sqrt{3}}{3}$ $\quad \cot x = -\frac{\sqrt{3}}{3}$

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

4. $\cos^3 x = \cos x$

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

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

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

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

$\cos x = \pm 1$

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

$x = 0$ $\quad x = \pi$

5. $\sin x - 2\sin x\cos x = 0$

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

$\sin x = 0$ $\quad 1 - 2\cos x = 0$

$x = 0, \pi$ $\quad -2\cos x = -1$

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

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

6. $2\sin^2 x - \sin x - 3 = 0$

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

$2\sin x - 3 = 0$ $\quad \sin x + 1 = 0$

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

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

7. $\csc^2 x - \csc x - 2 = 0$

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

$\csc x - 2 = 0$ $\quad \csc x + 1 = 0$

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

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

$x = \frac{\pi}{6}, \frac{5\pi}{6}$

8. $\cos^2 x = 1 - \sin x$

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

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

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

$\sin x = 0$ $\quad \sin x - 1 = 0$

$x = 0, \pi$ $\quad \sin x = 1$

$x = \frac{\pi}{2}$