Warm-up #8:
Solving Trig Equations

Ex. Solve: $[0, 2\pi)$

1. $3 = 3\csc\theta - \cot^2\theta$

$3 = 3\csc\theta - (\csc^2\theta - 1)$

$0 = -3 + 3\csc\theta - \csc^2\theta + 1$

$\csc^2\theta - 3\csc\theta + 2 = 0$

$(\csc\theta - 1)(\csc\theta - 2) = 0$

$\csc\theta - 1 = 0 \quad \csc\theta - 2 = 0$

$\csc\theta = 1 \quad \csc\theta = 2$

$\sin\theta = 1 \quad \sin\theta = \frac{1}{2}$

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

2. $\left(\sqrt{3}\sin\theta\right)^2 = (\cos\theta)^2$

$3\sin^2\theta = \cos^2\theta$

$3(1 - \cos^2\theta) = \cos^2\theta$

$3 - 3\cos^2\theta = \cos^2\theta$

$3 = 4\cos^2\theta$

$\sqrt{\frac{3}{4}} = \sqrt{\cos^2\theta}$

$\pm\frac{\sqrt{3}}{2} = \cos\theta$

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