Warm-up #9:
Solving Trig Equations

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

1. $-3\sqrt{3} + 2 + 3\cot\theta = 2 + 6\cot\theta$

$-3\cot\theta \quad -3\cot\theta$

$-3\sqrt{3} = 3\cot\theta$

$\frac{-3\sqrt{3}}{3} = \frac{3\cot\theta}{3}$

$-\sqrt{3} = \cot\theta$

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

2. $\cot\theta + \csc\theta = 1 + 2\csc\theta$

$-2\csc\theta \quad -2\csc\theta$

$\cot\theta - \csc\theta = 1$

$\frac{\cos\theta}{\sin\theta} - \frac{1}{\sin\theta} = 1$

$\frac{\cos\theta - 1}{\sin\theta} = 1$

$\sin\theta = \cos\theta - 1$

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

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

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

$-1 + \cos^2\theta + \cos^2\theta \quad -1$

$0 = 2\cos^2\theta - 2\cos\theta$

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

$2\cos\theta = 0 \qquad \cos\theta - 1 = 0$

$\cos\theta = 0 \qquad \cos\theta = 1$

$\theta = \frac{\pi}{2}, \frac{3\pi}{2} \qquad \theta = 0$