week 6 S.I. answers:

1. a. $\cot x + 1 = 0$ or $\csc x - 1 = 0$

$\cot x = -1$ $\qquad$ $\csc x = 1$

cot is -1 at $\boxed{\frac{3\pi}{4} + \frac{7\pi}{4}}$ $\qquad$ csc is 1 at $\boxed{\frac{\pi}{2}}$

b. $\cot x - \sqrt{3} = 0$ or $2\cos x - \sqrt{2} = 0$

$\cot x = \sqrt{3}$ $\qquad$ $\cos x = \frac{\sqrt{2}}{2}$

cot is $\sqrt{3}$ at $\boxed{\frac{\pi}{6} + \frac{7\pi}{6}}$ $\qquad$ cos x is $\frac{\sqrt{2}}{2}$ at $\boxed{\frac{\pi}{4} + \frac{7\pi}{4}}$

c. $2\sin x + \sqrt{2} = 0$ or $2\cos x - \sqrt{3} = 0$

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

$\sin x = -\frac{\sqrt{2}}{2}$ at $\boxed{\frac{5\pi}{4} + \frac{7\pi}{4}}$ $\qquad$ $\cos x = \frac{\sqrt{3}}{2}$ at $\boxed{\frac{\pi}{6} + \frac{11\pi}{6}}$

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2. a. $3\cot^2 x - 1 = 0 \quad \therefore \cot = \pm\frac{1}{\sqrt{3}}$ or $\pm\frac{\sqrt{3}}{3}$

cot is $\frac{\sqrt{3}}{3}$ at $\boxed{\frac{\pi}{3} + \frac{4\pi}{3}}$, $+ -\frac{\sqrt{3}}{3}$ at $\boxed{\frac{2\pi}{3} + \frac{5\pi}{3}}$

b. $\sec^2 x - 2 = 0 \quad \therefore \sec x = \pm\sqrt{2}$

sec x is $\sqrt{2}$ at $\boxed{\frac{\pi}{4} + \frac{7\pi}{4}}$ $+ -\sqrt{2}$ at $\boxed{\frac{3\pi}{4} + \frac{5\pi}{4}}$

c. $4\cos^2 x - 3 = 0 \quad \therefore \cos = \pm\sqrt{\frac{3}{4}}$ or $\pm\frac{\sqrt{3}}{2}$

$\cos x = \frac{\sqrt{3}}{2}$ at $\boxed{\frac{\pi}{6} + \frac{11\pi}{6}}$, $+ -\frac{\sqrt{3}}{2}$ at $\boxed{\frac{5\pi}{6} + \frac{7\pi}{6}}$

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3 a. $2\cos^2 x - 1 = 0 \quad \therefore \cos x = \pm\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$ $\qquad \cos(x) = \frac{\sqrt{2}}{2}$ at $\frac{\pi}{4} + \frac{7\pi}{4}\ldots$ $\qquad + -\frac{\sqrt{2}}{2}$ at $\frac{3\pi}{4} + \frac{5\pi}{4}\ldots$

$\therefore x = \frac{\pi}{4} + 2k\pi,\ k \in \mathbb{Z}$

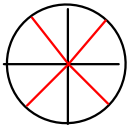
or $x = \frac{7\pi}{4} + 2k\pi,\ k \in \mathbb{Z}$

or $x = \frac{3\pi}{4} + 2k\pi,\ k \in \mathbb{Z}$

or $x = \frac{5\pi}{4} + 2k\pi,\ k \in \mathbb{Z}$

condense all equations

$\boxed{x = \frac{\pi}{4} + \frac{k\pi}{2},\ k \in \mathbb{Z}}$



b. $3\tan^2 x - 1 = 0 \quad \therefore \tan x = \pm\frac{1}{\sqrt{3}}$ or $\pm\frac{\sqrt{3}}{3}$ $\qquad \tan x = \frac{\sqrt{3}}{3}$ at $\frac{\pi}{6} + \frac{7\pi}{6}$, $+ -\frac{\sqrt{3}}{3}$ at $\frac{5\pi}{6} + \frac{11\pi}{6}$

$x = \frac{\pi}{6} + 2k\pi,\ k \in \mathbb{Z}$

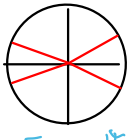
or $x = \frac{7\pi}{6} + 2k\pi,\ k \in \mathbb{Z}$

or $x = \frac{5\pi}{6} + 2k\pi,\ k \in \mathbb{Z}$

or $x = \frac{11\pi}{6} + 2k\pi,\ k \in \mathbb{Z}$

condense equations

$\boxed{x = \frac{\pi}{6} + k\pi,\ k \in \mathbb{Z} \quad \text{or} \quad x = \frac{5\pi}{6} + k\pi,\ k \in \mathbb{Z}}$



c. $\csc^2 x - 2 = 0 \quad \therefore \csc x = \pm\sqrt{2}$ $\qquad \csc x = \frac{1}{\sin x}$, so $\sin x = \pm\frac{1}{\sqrt{2}} = \pm\frac{\sqrt{2}}{2}$, $\frac{\sqrt{2}}{2}$ at $\frac{\pi}{4} + \frac{3\pi}{4}$, $-\frac{\sqrt{2}}{2}$ at $\frac{5\pi}{4} + \frac{7\pi}{4}$

$\therefore x = \frac{\pi}{4} + 2k\pi,\ k \in \mathbb{Z}$

or $x = \frac{7\pi}{4} + 2k\pi,\ k \in \mathbb{Z}$

or $x = \frac{3\pi}{4} + 2k\pi,\ k \in \mathbb{Z}$

or $x = \frac{5\pi}{4} + 2k\pi,\ k \in \mathbb{Z}$

condense all equations

$\boxed{x = \frac{\pi}{4} + \frac{k\pi}{2},\ k \in \mathbb{Z}}$