Math 36

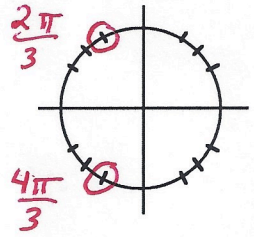
Test 3 Pretest, Chapter 6 ANSWERS

For each, it is important to read the instructions.

1. Find *all* radian solutions for x.

This means we'll add $2\pi k$ at the end of each solution.

a) $\sec x = -2$



We are not required to write each Quadrant

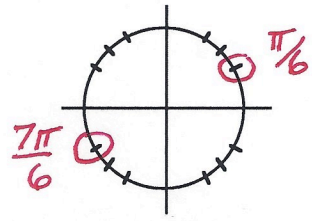
Q II: $x = \frac{2\pi}{3} + 2\pi k$

Q III: $x = \frac{4\pi}{3} + 2\pi k$

$k \in \mathbb{Z}$ *

We are required to write "$x =$" or "$\theta =$".

b) $\cot x = \sqrt{3}$



Full solution sets:

Q I: $x = \frac{\pi}{6} + 2\pi k$

Q III: $x = \frac{7\pi}{6} + 2\pi k$

$k \in \mathbb{Z}$ *

Because $\frac{\pi}{6}$ and $\frac{7\pi}{6}$ are in diagonal quadrants, the solution can be abbreviated to just:

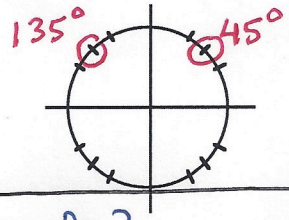
$x = \frac{\pi}{6} + \pi k,\ k \in \mathbb{Z}$ *

(Ask your instructor which solution set is preferred.)

2. Find *all* degree solutions for θ.

This means we'll add $360^\circ k$ at the end of each solution.

a) $\csc\theta = \sqrt{2}$

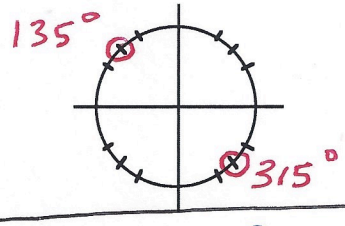


Q I: $\theta = 45^\circ + 360^\circ k$

Q II: $\theta = 135^\circ + 360^\circ k$

$k \in \mathbb{Z}$ *

b) $\tan\theta = -1$



Q II: $\theta = 135^\circ + 360^\circ k$

Q IV: $\theta = 315^\circ + 360^\circ k$

$k \in \mathbb{Z}$ *

Again, because these solutions are in diagonal quadrants, the solution set can be abbreviated:

$\theta = 135^\circ + 180^\circ k,\ k \in \mathbb{Z}$ *

Important note: It is not appropriate to add $2\pi k$ or $360^\circ k$ after a solution that has a restricted solving interval such as $0 \le x < 2\pi$ or $0^\circ \le \theta < 360^\circ$

* Ask your instructor if $k \in \mathbb{Z}$ is required when adding $2\pi k$ or $360^\circ k$.

3. Solve the equation for $0 \le x < 2\pi$.

These equations have a restricted solving interval, and the solutions sets must be in radians.

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

$2\cos^2 x = 1$

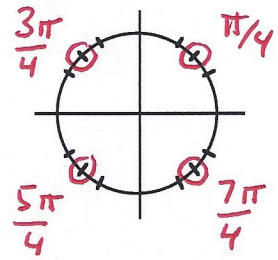
$\cos^2 x = \frac{1}{2}$

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

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

$\cos x = \pm \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

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

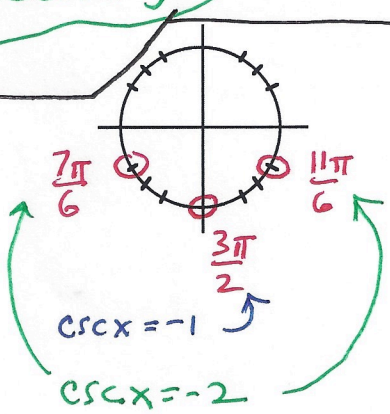


$$\boxed{x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}}$$

Note: For the purpose of explanation, more steps are shown than is necessary.

b) $\csc^2 x + 3\csc x + 2 = 0$

This equation is "quadratic in form," and we can substitute a variable (not x) for $\csc x$.



Let $w = \csc x$

$w^2 + 3w + 2 = 0$

$(w+1)(w+2) = 0$ When appropriate, we substitute back $\csc x$ for w.

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

$\csc x + 1 = 0$ or $\csc x + 2 = 0$

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

$x = \frac{3\pi}{2}$ $\quad$ $x = \frac{7\pi}{6}, \frac{11\pi}{6}$

Note: After solving for individual solutions, it is appropriate to write them as one solution set.

$$\boxed{x = \frac{3\pi}{2}, \frac{7\pi}{6}, \frac{11\pi}{6}}$$