

Name: _____

NO CALCULATOR

1. Simplify using trig identities

A. $\cos x \tan x$

$$= \frac{\cos x \cdot \sin x}{\cos x}$$

$$= \sin x$$

B. $\frac{\sin x \cos x}{1 - \sin^2 x}$

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

$$= \frac{\sin x}{\cos x} = \tan x$$

2. Simplify using the Pythagorean Identities

A. $\frac{\sin \phi - \cos^2 \phi \sin \phi}{\sin \phi}$

$$= \frac{\sin \theta - \cos^2 \theta \sin \theta}{\sin \theta}$$

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

$$= \sin^2 \theta$$

B. $\frac{\sec x}{\tan^2 x + 1}$

$$= \frac{\sec x}{\sec^2 x}$$

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

3. Verify using Trig and Pythagorean Identities:

A. $(1 + \tan^2 x)(1 - \sin^2 x) = 1$

$$(\sec^2 x)(\cos^2 x) = 1$$

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

$$\cos^2 x$$

$$1 = 1 \quad \checkmark$$

B. $\sin x + \cos x \cot x = \csc x$

$$\sin x + \cos x \cdot \frac{\cos x}{\sin x}$$

$$\sin x + \frac{\cos^2 x}{\sin x}$$

$$\frac{\sin^2 x + \cos^2 x}{\sin x}$$

$$\frac{1}{\sin x}$$

$$\csc x = \csc x \quad \checkmark$$

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Key

4. Solve over the interval [0, 2π) Solve the equation for solutions in the interval [0, 2π)

A. $3 \tan^2 x - 1 = 0$

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

$$\tan x = \pm \sqrt{\frac{1}{3}}$$

$$= \pm \frac{1}{\sqrt{3}}$$

$$\tan x = \pm \frac{\sqrt{3}}{3} \rightarrow \pi/6 \text{ fam}$$

$$\boxed{\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}}$$

B. $2 \cos^2 x + 3 \cos x = -1$

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

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

$$\boxed{\frac{2\pi}{3}, \frac{4\pi}{3}, \pi}$$

C. $2 \sin^2 x = -10 \cos x + 10$

$$2(1 - \cos^2 x) = -10 \cos x + 10$$

$$2 - 2 \cos^2 x = -10 \cos x + 10$$

$$0 = 2 \cos^2 x - 10 \cos x + 8$$

$$0 = 2(\cos^2 x - 5 \cos x + 4)$$

$$0 = 2(\cos x - 4)(\cos x - 1)$$

$$\cos x = 4 \quad \cos x = 1$$

$$\emptyset \quad x = 0, 2\pi$$

E. $2 \sin^2 x + \sin x = 0$

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

$$\sin x = 0 \quad \sin x = -\frac{1}{2}$$

$$0$$

$$\pi$$

$$\cancel{2\pi}$$

$$\frac{7\pi}{6}$$

$$6$$

$$\frac{11\pi}{6}$$

$$6$$

F. $\cos^2 x + 3 \sin x + 3 = 0$

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

$$0 = \sin^2 x - 3 \sin x - 4$$

$$0 = (\sin x - 4)(\sin x + 1)$$

$$\sin x = 4$$

$$\sin x = -1$$

$$\emptyset$$

$$\frac{3\pi}{2}$$