

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

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

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

$$= \sin^2 \theta$$

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

$$\frac{(\sec^2 x)(\cos^2 x)}{\cos^2 x} = 1$$

$$1 = 1 \quad \checkmark$$

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

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

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

$$\frac{1}{\sin x} = \csc x \quad \checkmark$$

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Key

4. Solve over the interval [0, 2π)

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

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

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

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

$$x = \pi/6, 5\pi/6, 7\pi/6, 11\pi/6$$

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

$$2\cos^2 x + 3\cos x + 1 = 0$$

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

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

$$x = \frac{2\pi}{3}, \frac{4\pi}{3}, \pi$$

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

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

$$\sin^2 x + 5\cos x - 5 = 0$$

$$1 - \cos^2 x + 5\cos x - 5 = 0$$

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

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

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

$$\cos x = 4 \quad (\text{X})$$

$$\cos x = 1$$

$$x = 0$$

D.  $2\cos^2 x = \cos x$

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

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

$$\cos x = 0 \quad 2\cos x = 1$$

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

$$x = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{3}, \frac{5\pi}{3}$$

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

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

$$\sin x = 0 \quad 2\sin x = -1$$

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

$$0, \pi, \frac{7\pi}{6}, \frac{11\pi}{6}$$

↓ Replace!

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

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

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

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

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

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

$$(\text{X})$$

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