

Unit 3 Review

Use identities to find the value of each expression.

1) Find $\cos \theta$ and $\cot \theta$

$$\text{if } \sec \theta = -\frac{7}{4} \text{ and } \sin \theta > 0.$$

2) Find $\tan \theta$ and $\sec \theta$

$$\text{if } \cot \theta = -\frac{4}{5} \text{ and } \sec \theta < 0.$$

Verify each identity.

$$3) \frac{1 - \csc x}{\csc x} = \sin x - 1$$

$$4) \tan^2 x - \cot^2 x = \sec^2 x - \csc^2 x$$

$$5) \frac{\csc^2 x}{\tan^2 x} = \frac{\cot^2 x}{\sin^2 x}$$

$$6) \csc^2 x + \sec^2 x = \frac{\csc^2 x}{\cos^2 x}$$

$$7) \cot x \sec^2 x \tan x = \tan^2 x + 1$$

$$8) \cot x \tan x - \sec^2 x = -\tan^2 x$$

$$9) \frac{\tan x + \cot x}{\sec x} = \csc x$$

Write each product as a sum or difference.

10) $2\cos 65^\circ\cos 30^\circ$

11) $\cos 30^\circ\cos 65^\circ$

12) $-4\sin \theta\cos 7\theta$

Write each sum or difference as a product.

13) $\cos 32^\circ + \cos 112^\circ$

14) $\sin 13^\circ - \sin 231^\circ$

15) $-4(\cos 15B - \cos 3B)$

Use the sum and difference formulas to find the exact value of each.

16) $\sin 105^\circ$

17) $\sin \frac{11\pi}{12}$

18) $\cos 15^\circ$

19) $\cos \frac{\pi}{12}$

20) $\tan 165^\circ$

21) $\tan \frac{\pi}{12}$

Use the half-angle identities to find the exact value of each.

22) $\sin 67.5^\circ$

23) $\cos 75^\circ$

24) $\tan 255^\circ$

Verify each identity.

25) $\frac{1 - \cos 2x}{\tan^2 x} = 1 + \cos 2x$

26) $\frac{1 - \cos 2x}{\cos^2 x} = 2\tan^2 x$

27) $\frac{1 + \cos 2x}{\cos x} = 2\cos x$

$$28) 1 + \cos 2x + \sin 2x = 2\cos x \cdot (\sin x + \cos x)$$

Solve each equation for $0 \leq \theta < 2\pi$.

$$29) 2\sec^2 \theta = -2\sqrt{3}\sec \theta - \sec^2 \theta$$

$$30) \sqrt{3}\sec \theta \cot \theta - \sec \theta - 2\cot \theta = -2\cot \theta$$

$$31) -\cos^2 \theta = 2\sin \theta - 2$$

$$32) -\sin \theta + \cos^2 \theta = \sin^2 \theta$$

$$33) 2\cos^2 \theta = 1 - \cos 2\theta$$

$$34) -\sin^2 2\theta = 2\sin^2 \theta - 2\sin^2 2\theta$$