In problems 1-6, verify each identity.

1. \((\cot^2 \theta + 1)(1 - \cos^2 \theta) = 1\)

2. \(\frac{1 + \csc \theta}{\cot \theta + \cos \theta} = \sec \theta\)

3. \(\frac{1 + \csc \theta}{\sec \theta} - \cot \theta = \cos \theta\)

4. \(\cos^4 \theta + \sin^2 \theta = \cos^2 \theta + \sin^4 \theta\)

5. \(\frac{\tan \theta}{1 + \sec \theta} + \frac{1 + \sec \theta}{\tan \theta} = 2 \csc \theta\)

6. \(\frac{\tan^2 x}{\sec x + 1} = \frac{1 - \cos x}{\cos x}\)

7. Use the sum/difference identities to find the exact value of \(\sin 255^\circ\).

8. Use the sum/difference identities to find the exact value of \(\cos 15^\circ\).

9. Use the sum/difference identities to find the exact value of \(\tan 285^\circ\).

10. Use the sum/difference identities to find the exact value of \(\cos \frac{7\pi}{12}\).

11. Find the exact values of \(\sin \left(\frac{\theta}{2}\right)\) and \(\cos \left(\frac{\theta}{2}\right)\) given \(\csc \theta = -\frac{5}{3}\) and \(-90^\circ < \theta < 0^\circ\)

In problems 12-14, find the exact value of each expression.

12. \(\cos \left(\sin^{-1} \left(-\frac{3}{8}\right)\right)\)

13. \(\tan \left(\cos^{-1} \left(-\frac{5}{13}\right)\right)\)

14. \(\cos \left(\sin^{-1} \left(-\frac{5}{13}\right) - \tan^{-1} \left(\frac{17}{8}\right)\right)\)
In problems 15 & 16, find sine and cosine of each of the following.

15. $\theta$, given $\cos 2\theta = -\frac{3}{4}$, $90^\circ < 2\theta < 180^\circ$

16. $\beta$, given $\cos 2\beta = \frac{1}{8}$, $\beta$ in quadrant IV

17. Find $\sin(x + y)$, $\cos(x + y)$, and the quadrant containing $(x + y)$ given $\tan x = -\frac{7}{24}$, $\cot y = \frac{3}{4}$, $x$ in quadrant II, $y$ in quadrant III.

In problems 18-21, solve each equation over the interval $[0, 2\pi)$.

18. $4\cos^2 t - 3 = 0$

19. $2\sin^2 t + \sin t - 1 = 0$

20. $\cos x = \cos 2x$

21. $2\cos^2 x + 3\cos x + 1 = 0$

22. Find all solutions to the equation $\cos^2 t - 4\cos t + 2 = 0$ in $[0^\circ, 360^\circ)$. Round solutions to 4-decimal places.