24. Find a value of θ for which $\cos\left(\theta + \frac{\pi}{2}\right) \neq \cos\theta + \cos\frac{\pi}{2}$.

Use the given information to determine the exact trigonometric value.

25. $\sin\theta = \frac{2}{5}$, $0° < \theta < 90°$; $\csc\theta$

26. $\tan\theta = \frac{\sqrt{3}}{4}$, $0 < \theta < \frac{\pi}{2}$; $\cot\theta$

27. $\sin\theta = \frac{1}{4}$, $0 < \theta < \frac{\pi}{2}$; $\cos\theta$

28. $\cos\theta = -\frac{2}{3}$, $90° < \theta < 180°$; $\sin\theta$

29. $\csc\theta = \frac{\sqrt{11}}{3}$, $\frac{\pi}{2} < \theta < \pi$; $\cot\theta$

30. $\sec\theta = -\frac{5}{4}$, $90° < \theta < 180°$; $\tan\theta$

31. $\sin\theta = -\frac{1}{3}$, $180° < \theta < 270°$; $\tan\theta$

32. $\tan\theta = \frac{2}{3}$, $\pi < \theta < \frac{3\pi}{2}$; $\cos\theta$

33. $\sec\theta = -\frac{7}{5}$, $180° < \theta < 270°$; $\sin\theta$

34. $\cos\theta = \frac{1}{8}$, $\frac{3\pi}{2} < \theta < 2\pi$; $\tan\theta$

35. $\cot\theta = -\frac{4}{3}$, $270° < \theta < 360°$; $\sin\theta$

36. $\cot\theta = -8$, $\frac{3\pi}{2} < \theta < 2\pi$; $\csc\theta$

37. If A is a second quadrant angle, and $\cos A = -\frac{\sqrt{3}}{4}$, find $\frac{\sec^2 A - \tan^2 A}{2\sin^2 A + 2\cos^2 A}$.

Express each value as a trigonometric function of an angle in Quadrant I.

38. $\sin 390°$

39. $\cos\frac{27\pi}{8}$

40. $\tan\frac{19\pi}{5}$

41. $\csc\frac{10\pi}{3}$

42. $\sec(-1290°)$

43. $\cot(-660°)$

Simplify each expression.

44. $\frac{\sec x}{\tan x}$

45. $\frac{\cot\theta}{\cos\theta}$

46. $\frac{\sin(\theta + \pi)}{\cos(\theta - \pi)}$

47. $(\sin x + \cos x)^2 + (\sin x - \cos x)^2$

48. $\sin x \cos x \sec x \cot x$

49. $\cos x \tan x + \sin x \cot x$

50. $(1 + \cos\theta)(\csc\theta - \cot\theta)$

51. $1 + \cot^2\theta - \cos^2\theta - \cos^2\theta\cot^2\theta$

52. $\frac{\sin x}{1 + \cos x} + \frac{\sin x}{1 - \cos x}$

53. $\cos^4\alpha + 2\cos^2\alpha\sin^2\alpha + \sin^4\alpha$

Applications and Problem Solving

54. **Optics** Refer to the equation derived in Example 5. What angle should the axes of two polarizing lenses make in order to block all light from passing through?

55. **Critical Thinking** Use the unit circle definitions of sine and cosine to provide a geometric interpretation of the opposite-angle identities.