

## Sum and Difference Identities

**Find the exact value of each.**

1)  $\sin -15$

2)  $\sin 165$

3)  $\cos \frac{17\pi}{12}$

4)  $\cos -105$

5)  $\tan 105$

6)  $\tan \frac{5\pi}{12}$

7) 
$$\frac{\tan \frac{8\pi}{9} - \tan \frac{\pi}{18}}{1 + \tan \frac{8\pi}{9} \tan \frac{\pi}{18}}$$

8)  $\cos 10\cos 35 - \sin 10\sin 35$

9) 
$$\frac{\tan 76 + \tan 164}{1 - \tan 76 \tan 164}$$

10) 
$$\sin \frac{\pi}{9} \cos \frac{2\pi}{9} + \cos \frac{\pi}{9} \sin \frac{2\pi}{9}$$

**Simplify.**

11)  $\sin -6\theta\cos 4\theta + \cos -6\theta\sin 4\theta$

12)  $\sin \theta\cos 3\theta + \cos \theta\sin 3\theta$

13)  $\cos 3x\cos -4x + \sin 3x\sin -4x$

14)  $\frac{\tan u + \tan 4u}{1 - \tan u \tan 4u}$

**Write each trigonometric expression as an algebraic expression.**

15)  $\sin\left(\cos^{-1}\frac{\sqrt{2}}{2} - \sin^{-1}2x\right)$

16)  $\sin(\sin^{-1}4x + \cos^{-1}x)$

17)  $\cos(\tan^{-1}2x + \sin^{-1}0)$

18)  $\tan(\tan^{-1}1 - \tan^{-1}\sqrt{x})$

**Verify each identity.**

19)  $\sin\left(\frac{\pi}{2} + \theta\right) = \cos \theta$

20)  $\cos(\pi + \theta) = -\cos \theta$