PreCalculus Name_____

Sum-Difference & Multiple Angles Formulas Date _____Period_____

Simplify each expression by writing it in terms of the sine or cosine of one angle.

1. $\sin 30° \cos 45° + \cos 30° \sin 45°$

2. $\cos 30° \cos 45° - \sin 30° \sin 45°$

3. $\sin\frac{\pi}{4}\cos\frac{2\pi}{3} - \cos\frac{\pi}{4}\sin\frac{2\pi}{3}$

4. $\cos\frac{7\pi}{6}\cos\frac{\pi}{3} + \sin\frac{7\pi}{6}\sin\frac{\pi}{3}$

Use the sum and difference identities for sine, cosine, and tangent to find the exact value of each trigonometric function.

5. $\cos 75°$

6. $\cos 195°$

7. $\cos\left(\frac{5\pi}{3} + \frac{\pi}{4}\right)$

8. $\cos\left(\frac{7\pi}{6} + \frac{\pi}{4}\right)$

9. $sin\ 75°$

10. $sin\ 195°$

11. $\sin\left(\frac{\pi}{3} + \frac{\pi}{4}\right)$

12. $\sin\left(\frac{\pi}{4} + \frac{4\pi}{3}\right)$

13. $tan\ 255°$

14. $tan\ 105°$

15. $\tan\left(\frac{5\pi}{3} + \frac{\pi}{4}\right)$

16. $\tan\left(\frac{4\pi}{3} + \frac{3\pi}{4}\right)$

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True or False.

17. $\cos 2(35°) = 1 - 2\ sin^2\ 35°$

18. $\cos 2(30°) = 2\ cos^2\ 60° - 1$

19. $\sin(-40°) = 2\sin(-20°)\cos(-20°)$

20. $\sin 2(36°) = 2\sin 72°\cos 72°$

21. $\tan 2(35°) = \frac{2\tan 70°}{1-\ tan^2\ 35°}$

22. $\tan(-70°) = \frac{2\tan(-35°)}{1-\ tan^2(-35°)}$

Use double-angle identities to find the exact value of each trigonometric function.

23. Find $\sin 2\alpha$, if $\cos\alpha = \frac{4}{5}$ and $\frac{3\pi}{2} <\ \alpha < 2\pi$

24. Find $\cos 2\theta$, if $\sin\theta = \frac{3}{5}$ and $\frac{\pi}{2} <\ \theta < \pi$

25. Find $\tan 2u$, if $\cos u = \frac{5}{13}$ and $\frac{3\pi}{2} <\ u < 2\pi$

Use half-angle identities to find exact value of each function. Assume $0 <\ \theta < 2\pi$

26. Find $cos\frac{\theta}{2}$, if $\cos\theta = \frac{4}{5}$ and θ lies in quadrant I

27. Find $tan\frac{\alpha}{2}$, if $\tan\alpha = -2$ and α lies in quadrant II

28. Find $sin\frac{u}{2}$, if $\cos u = \frac{\sqrt{2}}{2}$ and u lies in quadrant I

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