

Precalculus
5.3 Homework

Use appropriate identities to find the exact value of each expression.

1. $\cos(75^\circ)$

2. $\sin(195^\circ)$

3. $\tan(-13\pi/12)$

4. $\sin(7\pi/12)$

5. $\tan(255^\circ)$

6. $\cos(-\pi/12)$

Simplify each expression by using appropriate identities (odd/even, cofunction, and sum/difference).

7. $\cos(14^\circ)\cos(59^\circ) + \sin(14^\circ)\sin(59^\circ)$

8. $\sin(23^\circ)\cos(67^\circ) + \cos(23^\circ)\sin(67^\circ)$

9. $\frac{\tan(\pi/9) + \tan(\pi/6)}{1 - \tan(\pi/9)\tan(\pi/6)}$

10. $\sin(14^\circ)\cos(35^\circ) + \cos(-14^\circ)\cos(55^\circ)$

11. $\cos(10^\circ)\cos(20^\circ) + \sin(-10^\circ)\cos(70^\circ)$

Write each expression as a function of α alone. (Use sum or difference identities.)

12. $\cos(\pi/2 + \alpha)$

13. $\sin(\alpha - \pi)$

14. $\tan(\pi/4 + \alpha)$

Solve each problem.

15. Find the exact value of $\cos(\alpha + \beta)$ if $\sin \alpha = 3/5$ and $\sin \beta = 5/13$, with α in Quadrant II and β in Quadrant I.

16. Find the exact value of $\sin(\alpha + \beta)$ if $\sin \alpha = 7/25$ and $\sin \beta = -8/17$, with α in Quadrant II and β in Quadrant III.

17. Find the exact value of $\sin(\alpha - \beta)$ if $\cos \alpha = 2/3$ and $\sin \beta = -1/2$, with α in Quadrant I and β in Quadrant IV.

18. Find the value of $\cos(\alpha - \beta)$ if $\sin \alpha = \sqrt{3}/2$ and $\cos \beta = -\sqrt{2}/2$, with α in Quadrant I and β in Quadrant II.

Verify that each equation is an identity.

$$19. \frac{\sin(x+y)}{\sin x \cos y} = 1 + \cot x \tan y$$

$$20. \cos(x - \pi/2) = \cos x \tan x$$

$$21. \frac{\cos(x+y)}{\cos x \cos y} = 1 - \tan x \tan y$$

$$22. \sin(\alpha + \beta) \sin(\alpha - \beta) = \sin^2 \alpha - \sin^2 \beta$$

$$23. \frac{\cos(\alpha - \beta)}{\sin(\alpha + \beta)} = \frac{1 + \tan \alpha \tan \beta}{\tan \alpha + \tan \beta}$$

$$24. \sin(2x) = 2 \sin x \cos x \quad (\text{Hint for 24 \& 25: } 2x = x + x).$$

$$25. \cos(2x) = \cos^2 x - \sin^2 x$$