

Practice Test

For the following exercises, simplify the given expression.

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

2. $\sin(-x) \cos(-2x) - \sin(-x) \cos(-2x)$

3. $\csc(\theta) \cot(\theta) (\sec^2 \theta - 1)$

4. $\cos^2(\theta) \sin^2(\theta) (1 + \cot^2(\theta)) (1 + \tan^2(\theta))$

For the following exercises, find the exact value.

5. $\cos\left(\frac{7\pi}{12}\right)$

6. $\tan\left(\frac{3\pi}{8}\right)$

7. $\tan\left(\sin^{-1}\left(\frac{\sqrt{2}}{2}\right) + \tan^{-1}\sqrt{3}\right)$

8. $2 \sin\left(\frac{\pi}{4}\right) \sin\left(\frac{\pi}{6}\right)$

9. $\cos\left(\frac{4\pi}{3} + \theta\right)$

10. $\tan\left(-\frac{\pi}{4} + \theta\right)$

For the following exercises, simplify each expression. Do not evaluate.

11. $\cos^2(32^\circ)\tan^2(32^\circ)$

12. $\cot\left(\frac{\theta}{2}\right)$

For the following exercises, find all exact solutions to the equation on $[0, 2\pi)$.

13. $\cos^2 x - \sin^2 x - 1 = 0$

14. $\cos^2 x = \cos x$

15. $\cos(2x) + \sin^2 x = 0$

16. $2 \sin^2 x - \sin x = 0$

17. Rewrite the expression as a product instead of a sum: $\cos(2x) + \cos(-8x)$.

For the following exercise, rewrite the product as a sum or difference.

18. $8 \cos(15x) \sin(3x)$

For the following exercise, rewrite the sum or difference as a product.

19. $2(\sin(8\theta) - \sin(4\theta))$

20. Find all solutions of
 $\tan(x) - \sqrt{3} = 0.$

21. Find the solutions of
 $\sec^2 x - 2 \sec x = 15$ on
the interval $[0, 2\pi)$
algebraically; then graph
both sides of the equation
to determine the answer.

For the following exercises, find all solutions exactly on the interval $0 \leq \theta \leq \pi$

22. $2 \cos\left(\frac{\theta}{2}\right) = 1$

23. $\sqrt{3} \cot(y) = 1$

24. Find $\sin(2\theta)$, $\cos(2\theta)$, and
 $\tan(2\theta)$ given $\cot \theta = -\frac{3}{4}$
and θ is on the interval
 $\left[\frac{\pi}{2}, \pi\right]$.

25. Find $\sin\left(\frac{\theta}{2}\right)$, $\cos\left(\frac{\theta}{2}\right)$, and
 $\tan\left(\frac{\theta}{2}\right)$ given $\cos \theta = \frac{7}{25}$
and θ is in quadrant IV.

26. Rewrite the expression
 $\sin^4 x$ with no powers
greater than 1.

For the following exercises, prove the identity.

27. $\tan^3 x - \tan x \sec^2 x = \tan(-x)$

28. $\sin(3x) - \cos x \sin(2x) = \cos^2 x \sin x - \sin^3 x$

29. $\frac{\sin(2x)}{\sin x} - \frac{\cos(2x)}{\cos x} = \sec x$

30. Plot the points and find a function of the form $y = A \cos(Bx + C) + D$ that fits the given data.

x	0	1	2	3	4	5
y	-2	2	-2	2	-2	2

31. The displacement $h(t)$ in centimeters of a mass suspended by a spring is modeled by the function $h(t) = \frac{1}{4} \sin(120\pi t)$, where t is measured in seconds. Find the amplitude, period, and frequency of this displacement.

33. Two frequencies of sound are played on an instrument governed by the equation $n(t) = 8 \cos(20\pi t) \cos(1000\pi t)$. What are the period and frequency of the "fast" and "slow" oscillations? What is the amplitude?