

Equivalent Representation of Trig Functions (3.12) Homework

- The function f is given by $f(x) = 4 \csc x \sec x$. For what value of a is $f(x) = a \csc(2x)$ an equivalent form of f ?
(A) $\frac{1}{8}$ (C) $\frac{1}{2}$
(B) 8 (D) 2
- Without a calculator, evaluate each of the following expressions
 - $6 \sin\left(\frac{\pi}{12}\right) \cos\left(\frac{\pi}{12}\right)$
 - $2 \cos^2\left(\frac{\pi}{8}\right) - 1$
 - $8 \cos^2\left(\frac{5\pi}{12}\right) - 8 \sin^2\left(\frac{5\pi}{12}\right)$
 - $\sin\left(\frac{\pi}{8}\right) \cos\left(\frac{3\pi}{8}\right) - \cos\left(\frac{\pi}{8}\right) \sin\left(\frac{3\pi}{8}\right)$
 - $\cos\left(\frac{5\pi}{8}\right) \cos\left(\frac{7\pi}{8}\right) + \sin\left(\frac{5\pi}{8}\right) \sin\left(\frac{7\pi}{8}\right)$
 - $\cos\left(\frac{4\pi}{3} - \frac{\pi}{4}\right)$
- Match each expression on the left with the equivalent expression on the right.

a. $\sin\left(\frac{\pi}{2} - x\right)$	i. $\sin x$
b. $\sin(x + \pi)$	ii. $\cos x$
c. $\cos(x + \pi)$	iii. $-\sin x$
d. $\cos\left(x - \frac{\pi}{2}\right)$	iv. $-\cos x$
- Match each expression on the left with the equivalent expression on the right.

a. $\cos(2x - \pi)$	i. $2 \cos^2 x - 1$
b. $\cos\left(-2x + \frac{5\pi}{2}\right)$	ii. $2 \sin^2 x - 1$
c. $\sin(2x + \pi)$	iii. $-2 \sin x \cos x$
d. $\sin\left(2x + \frac{\pi}{2}\right)$	iv. $2 \sin x \cos x$
- When graphed in standard position, the terminal ray of the angle θ intersects a circle of radius 5 at the point $(3, -4)$.

a. Find $\sin \theta$	e. Find $\sin\left(\theta - \frac{\pi}{4}\right)$
b. Find $\sec \theta$	f. Find $\csc(2\theta)$
c. Find $\tan \theta$	g. Find $\cos(\theta + \pi)$
d. Find $\cos(2\theta)$	h. Find $\sin(2\theta - \pi)$
- The function r is given by $r(x) = \frac{1}{1 + \tan^2 x}$. Rewrite r as a function of $\cos(x)$ and no other trigonometric function.
- The function t is given by $t(x) = \sin(2x) \sec(x)$. Rewrite $t(x)$ as an expression in terms of $\sin x$ with no other trigonometric functions involved.

8. The function h is given by $h(x) = \frac{\cos x}{\sin^2 x - 1}$. Rewrite h as an expression in which $\sec x$ appears once and no other trigonometric functions are involved.
9. The function g is given by $g(x) = (1 - \cos^2 x)(\sec(2x))$. Rewrite $g(x)$ as a fraction involving powers of $\sin x$ and no other trigonometric functions.
10. The function f is given by $f(x) = \frac{\cos(2\theta)}{\cos^2 \theta}$. Rewrite $f(x)$ as an expression in which a power of $\tan x$ appears once and no other trigonometric functions are involved.
11. The function k is given by $k(x) = \frac{1}{1 - \sin x} + \frac{1}{1 + \sin x}$. Rewrite $k(x)$ as an expression in which a power of $\sec x$ appears once and no other trigonometric functions are involved.
12. When graphed in standard position, the terminal ray of the angle $\frac{2\pi}{3}$ intersects a circle of radius 10 at what coordinates?
13. When graphed in standard position, the terminal ray of the angle θ has slope $\frac{3}{4}$. Find $\cot(\theta)$.
14. Consider a circle centered at the origin in the xy -plane. An angle of measure $\frac{\pi}{3}$ radians in standard position has a terminal ray that intersects the circle at point P . The angle is subtended by an arc of the circle in Quadrant I with length 40 units. What is the radius of the circle?

Evaluate

15. $\sin\left(\frac{5\pi}{2}\right)$

18. $\sec\left(\frac{\pi}{3}\right)$

21. $\arcsin\left(-\frac{1}{2}\right)$

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

19. $\csc\left(\frac{5\pi}{6}\right)$

22. $\arccos\left(\frac{1}{\sqrt{2}}\right)$

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

20. $\cot\left(-\frac{\pi}{4}\right)$

23. $\arctan(1)$

Equivalent Representations of Trig Functions HW Answers

1. B

2.

a. $\frac{3}{2}$

b. $\frac{\sqrt{2}}{2}$

c. $-4\sqrt{3}$

d. $-\frac{\sqrt{2}}{2}$

e. $\frac{\sqrt{2}}{2}$

f. $\frac{-\sqrt{2}-\sqrt{6}}{4} = -\frac{\sqrt{2}+\sqrt{6}}{4}$

3. a. $\sin\left(\frac{\pi}{2} - x\right) = \text{ii. } \cos x$

b. $\sin(x + \pi) = \text{iii. } -\sin x$

c. $\cos(x + \pi) = \text{iv. } -\cos x$

d. $\cos\left(x - \frac{\pi}{2}\right) = \text{i. } \sin x$

4. a. $\cos(2x - \pi) = \text{ii. } 2\sin^2 x - 1$

b. $\cos\left(-2x + \frac{\pi}{2}\right) = \text{iv. } 2\sin x \cos x$

c. $\sin(2x + \pi) = \text{iii. } -2\sin x \cos x$

d. $\sin\left(2x + \frac{\pi}{2}\right) = \text{i. } 2\cos^2 x - 1$

5.

a. $-\frac{4}{5}$

b. $\frac{5}{3}$

c. $-\frac{4}{3}$

d. $-\frac{7}{25}$

e. $\frac{-7\sqrt{2}}{10}$

f. $-\frac{25}{24}$

g. $-\frac{3}{5}$

h. $\frac{24}{25}$

6. $r(x) = \cos^2 x$

7. $t(x) = 2\sin x$

8. $h(x) = -\sec x$

9. $g(x) = \frac{\sin^2 x}{1-2\sin^2 x}$

10. $f(x) = 1 - \tan^2 x$

11. $k(x) = 2\sec^2 x$

12. $(-5, 5\sqrt{3})$

13. $\frac{4}{3}$

14. $\frac{120}{\pi}$

15. 1

16. $-\frac{1}{2}$

17. $\sqrt{3}$

18. 2

19. 2

20. -1

21. $-\frac{\pi}{6}$

22. $\frac{\pi}{4}$

23. $\frac{\pi}{4}$