Precalculus

Name Key

5.1–5.2 Practice Worksheet

Use the given values to evaluate the remaining trigonometric functions of the angle.

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1. $\sin x = \frac{4}{5}, \cos x < 0$ * Quadrant II

$\left(\frac{4}{5}\right)^2 + \cos^2 x = 1$

$\cos^2 x = 1 - \frac{16}{25}$

$\cos^2 x = \frac{9}{25}$

$\cos x = \frac{-3}{5}$

$\sin x = \frac{4}{5}$ $\csc x = \frac{5}{4}$

$\cos x = \frac{-3}{5}$ $\sec x = -\frac{5}{3}$

$\tan x = -\frac{4}{3}$ $\cot x = -\frac{3}{4}$

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2. $\tan\theta = \frac{2}{3}, \sec\theta > 0$ * Quadrant I

$1 + \left(\frac{2}{3}\right)^2 = \sec^2\theta$

$1 + \frac{4}{9} = \sec^2\theta$

$\frac{13}{9} = \sec^2\theta$

$\frac{\sqrt{13}}{3} = \sec\theta$

$1 + \left(\frac{3}{2}\right)^2 = \csc^2\theta$

$1 + \frac{9}{4} = \csc^2\theta$

$\frac{13}{4} = \csc^2\theta$

$\frac{\sqrt{13}}{2} = \csc\theta$

$\sin\theta = \frac{2\sqrt{13}}{13}$ $\csc\theta = \frac{\sqrt{13}}{2}$

$\cos\theta = \frac{3\sqrt{13}}{13}$ $\sec\theta = \frac{\sqrt{13}}{3}$

$\tan\theta = \frac{2}{3}$ $\cot\theta = \frac{3}{2}$

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In #3-6, match the expression with one of the following:

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A. 1 B. $\cos^2 x$ C. $1+\cot x$

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3. $\frac{1}{\tan^2 x + 1}$

$\frac{1}{\sec^2 x}$

$\cos^2 x$

$\boxed{B.}$

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4. $\frac{\sin^2 x - \cos^2 x}{\sin^2 x - \sin x \cos x}$ * factor

$\frac{\cancel{(\sin x - \cos x)}(\sin x + \cos x)}{\sin x \cancel{(\sin x - \cos x)}}$

$\frac{\sin x + \cos x}{\sin x} = 1 + \cot x$

$\boxed{C.}$

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5. $\tan^2 x(\csc^2 x - 1)$

$\tan^2 x(\cot^2 x)$

$\tan^2 x\left(\frac{1}{\tan^2 x}\right)$

1

$\boxed{A.}$

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6. $\csc^2 x(1 - \cos^2 x)$

$\csc^2 x(\sin^2 x)$

$\frac{1}{\sin^2 x} \cdot \sin^2 x$

1

$\boxed{A.}$

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Simplify the expression.

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7. $\csc x - \cos x \cot x$

$\frac{1}{\sin x} - \cos x \cdot \frac{\cos x}{\sin x}$

$\frac{1}{\sin x} - \frac{\cos^2 x}{\sin x}$

$\frac{1 - \cos^2 x}{\sin x} = \frac{\sin^2 x}{\sin x} = \boxed{\sin x}$

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8. $\sin t + \cot t \cos t$

$\sin t + \frac{\cos t}{\sin t} \cdot \cos t$

$\frac{\sin t}{1} + \frac{\cos^2 t}{\sin t} = \frac{\sin^2 t}{\sin t} + \frac{\cos^2 t}{\sin t}$

$= \frac{\sin^2 t + \cos^2 t}{\sin t} = \frac{1}{\sin t} = \boxed{\csc t}$

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Verify each trigonometric identity. Answers will vary!

9. $\cos x\left(\tan^2 x+1\right)=\sec x$ $\cos x(\sec^2 x)=$ $\cos x\left(\frac{1}{\cos^2 x}\right)=$ $\frac{1}{\cos x}=$ $\sec x=\sec x$	10. $\sec^2 x\cot x-\cot x=\tan x$ $\cot x(\sec^2 x-1)=$ $\cot x(\tan^2 x)=$ $\frac{1}{\tan x}\cdot\tan^2 x=$ $\tan x=\tan x$
11. $\sin^3 x+\sin x\cos^2 x=\sin x$ $\sin x(\sin^2 x+\cos^2 x)=$ $\sin x(1)=$ $\sin x=\sin x$	12. $\cot^2 x-\cos^2 x=\cot^2 x\cos^2 x$ $=\cot^2 x(1-\sin^2 x)$ $=\cot^2 x-\cot^2 x\sin^2 x$ $=\cot^2 x-\frac{\cos^2 x}{\sin^2 x}\cdot\sin^2 x$ $\cot^2 x-\cos^2 x=\cot^2 x-\cos^2 x$
13. $\frac{\csc x}{1+\cot^2 x}=\sin x$ $\frac{\csc x}{\csc^2 x}=$ $\frac{1}{\csc x}=$ $\sin x=\sin x$	14. $\frac{\tan x\csc x}{\sec x}=1$ $\frac{\frac{\sin x}{\cos x}\cdot\frac{1}{\sin x}}{\frac{1}{\cos x}}=$ $\frac{1}{\cos x}\cdot\frac{\cos x}{1}=$ $1=1$
15. $\sin^2 x\cos^2 x+\sin^4 x=\sin^2 x$ $\sin^2 x(\cos^2 x+\sin^2 x)=$ $\sin^2 x(1)=$ $\sin^2 x=\sin^2 x$	16. $\frac{\cos x\sec x}{1+\tan^2 x}=\cos^2 x$ $\frac{\cos x\cdot\frac{1}{\cos x}}{\sec^2 x}=$ $\frac{1}{\sec^2 x}=$ $\cos^2 x=\cos^2 x$