

5.1 Using Fundamental Identities

Reciprocal and Quotient Identities

Pythagorean Identities

Simplifying Trigonometric Expressions

Using Factoring and Foiling to Simplify

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Reciprocal Identities

$$\sin \theta = \frac{1}{\csc \theta}$$

$$\cos \theta = \frac{1}{\sec \theta}$$

$$\tan \theta = \frac{1}{\cot \theta}$$

$$\csc \theta = \frac{1}{\sin \theta}$$

$$\sec \theta = \frac{1}{\cos \theta}$$

$$\cot \theta = \frac{1}{\tan \theta}$$

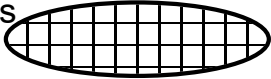

Quotient Identities

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$

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Pythagorean Identities

$\sin^2 x + \cos^2 x = 1$ $\sin^2 x = 1 - \cos^2 x$ $\cos^2 x = 1 - \sin^2 x$ $\sin^2 x - 1 = -\cos^2 x$ $\cos^2 x - 1 = -\sin^2 x$ $\frac{\sin^2 x + \cos^2 x}{\sin^2 x} = \frac{1}{\sin^2 x}$ $1 + \cot^2 x = \csc^2 x$ $\frac{\sin^2 x + \cos^2 x}{\cos^2 x} = \frac{1}{\cos^2 x}$ $\tan^2 x + 1 = \sec^2 x$	 $\tan^2 x + 1 = \sec^2 x$ $\tan^2 x = \sec^2 x - 1$ $\tan^2 x - \sec^2 x = -1$	 $1 + \cot^2 x = \csc^2 x$ $1 = \csc^2 x - \cot^2 x$ $1 - \csc^2 x = -\cot^2 x$
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<p>Simplifying Trig Expressions</p> <p>1. $\tan x \csc x$ $\left(\frac{\cancel{\sin x}}{\cos x}\right) \left(\frac{1}{\cancel{\sin x}}\right) = \frac{1}{\cos x} = \sec x$</p> <p>2. $\cos^2 x (1 - \sec^2 x)$ $\cos^2 x (-\tan^2 x)$ $\cancel{\cos^2 x} \left(\frac{-\cancel{\sin^2 x}}{\cancel{\cos^2 x}}\right) = -\sin^2 x$</p> <p>3. $(1 + \cot^2 x) \sin x$ $\csc^2 x \cdot \cancel{\sin x}$ $\csc x$ $\frac{1}{\cancel{\sin x}} \cdot \cancel{\sin x} = \frac{1}{\sin x} = \csc x$</p>	<p>Rules/Suggestions/Look for</p> <p>reciprocal functions quotient functions rewrite w/ sine/cosine</p> <p>$\cos^2 x - 1$ Pythagorean Identities $-\sin^2 x$ reciprocal pairs to multiply $\cos^2 x \cdot 1 - \cancel{\sec^2 x} \cdot \cancel{\cos^2 x}$</p> <p>$\csc x \cdot \cancel{\csc x} \cdot \cancel{\sin x}$</p>
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Factoring and Foiling to Simplify

4. $\frac{\sin^2 \beta - 1}{\sin \beta - 1}$

$$x = \sin^2 \beta \quad x^2 - 1 \rightarrow (x+1)(x-1)$$

$$\frac{(\sin \beta + 1)(\cancel{\sin \beta - 1})}{\cancel{\sin \beta - 1}} \quad \sin \beta + 1$$

5. $\sec^4 x - \tan^4 x$

$$(\cancel{\sec^2 x - \tan^2 x})(\sec^2 x + \tan^2 x)$$

(by P.I.)

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6. $(5 - 5 \sin x)(5 + 5 \sin x)$

$$25 + \cancel{25 \sin x} - \cancel{25 \sin x} - 25 \sin^2 x$$

$$25 - 25 \sin^2 x \quad \text{factor out 25}$$

$$25(1 - \sin^2 x) \quad (\text{P.I.})$$

$$25 \cos^2 x$$

7. $\frac{1}{\sec x - 1} - \frac{1}{\sec x + 1}$

$$\frac{(\sec x + 1) - (\sec x - 1)}{(\sec x - 1)(\sec x + 1)} \quad \text{common denom}$$

$$\frac{\cancel{\sec x} + 1 - \cancel{\sec x} + 1}{\sec^2 x + \cancel{\sec x} - \cancel{\sec x} - 1}$$

$$\frac{2}{\sec^2 x - 1} \quad \text{P.I.}$$

$$\frac{2}{\tan^2 x}$$

$$2 \cot^2 x \quad \text{reciprocals}$$

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HOMework



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11-17 odd, 21, 23, 27-33 odd, 51-67
odd

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