Trigonometric Identities

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18 March 2024

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Announcements

1. Homework in M.O.M.
2. Exam 2 on Friday.

Verifying Trigonometric Identities

Today we're going to talk about how to verify trig identities. Let's start with an example:
We want to *verify* that

$$\sin(x)\sec(x) = \tan(x)$$

Let's see how we do that:

Verifying Trigonometric Identities

Basic Principals of Verifying Trig Identities

Here are 4 basic principals for verifying trig identities:

1. Always work on only one side of the equation. Try to work on the most _____ side. (It's easier to _____ than to build)
2. Look for opportunities to _____, _____ or add _____.
3. Note which functions are in the final expression, and look for opportunities to make appropriate _____.
4. If all else fails, try changing everything to _____ and _____.

Fundamental Identities

The following are fundamental identities that you can take for granted when trying to verify other trig identities:

Pythagorean Identities

$$\sin^2(x) + \cos^2(x) =$$

$$\tan^2(x) + 1 =$$

$$1 + \cot^2(x) =$$

Even/Odd identities

1. $\sin(-x) =$
2. $\cos(-x) =$
3. $\tan(-x) =$
4. $\csc(-x) =$

Fundamental Identities

Recipricol Identities

1. $\csc(x) =$
2. $\sec(x) =$
3. $\cot(x) =$

Quotient Identities

1. $\tan(x) =$
2. $\cot(x) =$

Example

Let's verify another trig identity:

$$\frac{\sin(x)}{\tan(x)} = \cos(x)$$

Example

Example

Verify that

$$\csc(x)\cos(x)\tan(x) = 1$$

Example

Example

Verify

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

Example

Example

Verify

$$\sin(x)\cos(x) + \sin^2(x)\tan(x) = \tan(x)$$

Example

Example

Verify

$$\frac{\sin^2(x) - \cos^2(x)}{\sin(x) - \cos(x)} = \sin(x) + \cos(x).$$

Example

Example

One more!

Verify

$$\frac{\cos(x)}{1+\sin(x)} = \frac{1-\sin(x)}{\cos(x)}$$

Example

Example

How can we see a claimed identity is false? For example: Is it true that

$$\sin(2x) = 2\sin(x)?$$