


SECTION 3.6 BASIC TRIGONOMETRIC IDENTITIES

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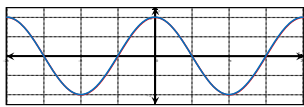
D) WHAT IS A TRIGONOMETRIC IDENTITY?

- A trigonometric identity is an
- Examples of trigonometric identities
 $\sin(x) = \cos\left(x - \frac{\pi}{2}\right)$
- Trigonometric equations that are not Identities
 $\sin x = 0.5$

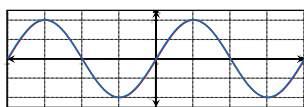



II) ODD VS EVEN IDENTITIES:

- Even Identities: An function that

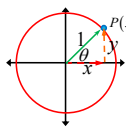


- Odd Identities: A function that looks

III) PYTHAGOREAN IDENTITIES:

- Review: The coordinates of any point on the circumference of an unit circle can be represented by:



$$\cos \theta = x \quad \sin \theta = y$$

- Other Pythagorean Identities can be generated by dividing all



IV) BASIC IDENTITIES

- Odd- Even Identities
- Reciprocal Identities
- Quotient Identities
- Pythagorean Identities



V) VERIFYING AND PROVING IDENTITIES

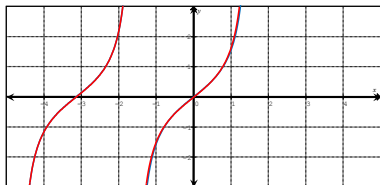
- There are two ways to Verify an identity
 - Plug variety of numbers into the equation
 - If the equation is equal for all the values,
OR
 - Graph the equations,
- Proving an Identity
 - Simplify the equation
 - When proving algebraically,
 - Then simplify using



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EX: VERIFY THE FOLLOWING IDENTITY:

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



PRACTICE: VERIFY THE FOLLOWING IDENTITIES NUMERICALLY:

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

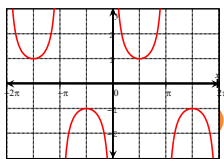
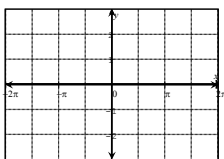
ii) $\frac{2 \tan x}{1 + \tan^2 x} = 2 \sin x \cos x$



PRACTICE: VERIFY EACH OF THE FOLLOWING IDENTITIES:

$\sin^2 x + \sin^2 x \cot^2 x = 1$

$\sin x + \cot x \cos x = \sec x$



VI) PROVING IDENTITIES ALGEBRAICALLY:

- When proving trigonometric identities:
 - Convert all trig. functions to sine or cosine

 - Use basic trig. Identities to simplify complicated ones
 -
 - Start with the side that looks
 - You may need

 - Trial and
 - Once the left side and right side are



VII) PROVING TRIGONOMETRIC IDENTITIES BY USING BASIC IDENTITIES:

$$\sin x \sec x = \tan x$$

$$\frac{\tan x \cos x}{\sin x} = 1$$

<i>Left Side</i>	<i>Right Side</i>

<i>Left Side</i>	<i>Right Side</i>



VIII) PROVING BY ADDING/SUBTRACTING IDENTITIES

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

<i>Left Side</i>	<i>Right Side</i>

<i>Left Side</i>	<i>Right Side</i>



PRACTICE: PROVE THE FOLLOWING IDENTITIES:

$$\cot x + \sec x = \frac{\cos^2 x + \sin x}{\sin x \cos x}$$

Left Side | *Right Side*

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$$\frac{\sin \theta + \tan \theta}{\cos \theta + 1} = \tan \theta$$

Left Side | *Right Side*

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IX) PROVING IDENTITIES USING FRACTIONS :

$$\frac{\tan^2 x + 1}{\csc^2 x - 1} = \sec^2 x (\tan^2 x)$$

Left Side | *Right Side*

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Left Side | *Right Side*

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X) PROVING IDENTITIES BY FACTORING:

$$\sec^4 x - 1 = \frac{\sin^2 x + \sin^2 x \cos^2 x}{\cos^4 x}$$

Left Side | *Right Side*

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PRACTICE: PROVE THE FOLLOWING IDENTITIES BY FACTORING

$$4 - \sec^2 x + 1 = (2 - \tan x)(2 + \tan x)$$

$$(\cot x - 1)^2 = \csc^2 x - 2 \cot x$$

<i>Left Side</i>	<i>Right Side</i>

<i>Left Side</i>	<i>Right Side</i>

XI) PROVE BY CONJUGATING THE EXPRESSION:

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

<i>Left Side</i>	<i>Right Side</i>

Quotient Identities

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

Reciprocal Identity

$$\cot \theta = \frac{\cos \theta}{\sin \theta} \quad \csc \theta = \frac{1}{\sin \theta}$$

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

Pythagorean Identity

$$\sin^2 x + \cos^2 x = 1$$

$$\tan^2 x + 1 = \sec^2 x$$

$$1 + \cot^2 x = \csc^2 x$$

Formula Sheet

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PRACTICE: PROVE THE FOLLOWING IDENTITY BY CONJUGATING THE EXPRESSION:

$$\frac{\cot x}{\csc x + 1} = \frac{\csc x - 1}{\cot x}$$

<i>Left Side</i>	<i>Right Side</i>

Formula Sheet

Quotient Identities

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

Reciprocal Identity

$$\cot \theta = \frac{\cos \theta}{\sin \theta} \quad \csc \theta = \frac{1}{\sin \theta}$$

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

Pythagorean Identity

$$\sin^2 x + \cos^2 x = 1$$

$$\tan^2 x + 1 = \sec^2 x$$

$$1 + \cot^2 x = \csc^2 x$$

CLOSE

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