MHF 4UI

Unit 6 - Trig Functions II

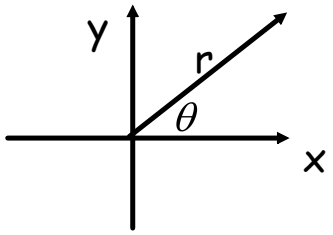
Day 1 - Review of Grade 11 Identities

Recall the reciprocal trig ratios

$\sec\theta =$ $\csc\theta =$ $\cot\theta =$

Introduction to Trig Identities

Recall:



$r^2 = x^2 + y^2$

$\sin\theta =$ $\quad$ $\csc\theta =$

$\cos\theta =$ $\quad$ $\sec\theta =$

$\tan\theta =$ $\quad$ $\cot\theta =$

Evaluate:(using terminal arm)

1. $\dfrac{\sin\theta}{\cos\theta}$

2. $\sin^2\theta + \cos^2\theta$

3. $\dfrac{1}{\sin\theta}$

4. $\dfrac{1}{\cos\theta}$

5. $\dfrac{1}{\tan\theta}$

Examples: Write an equivalent expression for:

$(a)\ \tan x \cos x$

$(b)\ \sin^2 \theta$

$(c)\ \dfrac{1}{\tan^2 \theta}$

Proving Trigonometric Identities

Quotient Identity (QI):

$$\frac{\sin\theta}{\cos\theta} = \tan\theta \quad \textit{and} \quad \frac{\sin^2\theta}{\cos^2\theta} = \tan^2\theta$$

Pythagorean Identity (PI):

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

Reciprocal Identities (RI):

$$\csc\theta = \frac{1}{\sin\theta} \quad \textit{and} \quad \sec\theta = \frac{1}{\cos\theta} \quad \textit{and} \quad \cot\theta = \frac{1}{\tan\theta}$$

$$\csc^2\theta = \frac{1}{\sin^2\theta} \qquad \sec^2\theta = \frac{1}{\cos^2\theta} \qquad \cot^2\theta = \frac{1}{\tan^2\theta}$$

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

$$\cot^2\theta = \frac{\cos^2\theta}{\sin^2\theta}$$

An identity is an equality that is true for any value of the variable which in this case is the value of the angle θ.

You have seen "identities" before: $(x-5)(x+5) = x^2 - 25$ is considered an identity...we can replace one side of the equation with the other and still have the same value.

We use identities to write an expression in a more convenient form.

When proving trig identities:

1. Separate the LS from the RS.
2. Start with the most complicated side.
3. Use algebra, QI, PI and RI to rewrite one expression
4. Keep working until LS = RS.
5. Finish the proof: Q.E.D (put at the end to say you're done!)

Q.E.D.

Example 1: Prove $\frac{\cos x \tan x}{\sin x} = 1$

Example 2: Prove $\frac{1}{1-\cos x} + \frac{1}{1+\cos x} = \frac{2}{\sin^2 x}$