Sunday, February 03, 2019
12:41 PM

KEY

Precalc 5.1B:Using Identities

Obj: To apply the fundamental trig identities to simplify trig expressions;

Hwk: 5.1B #45 - 63 odd, Check answers!!!
Finish 5.1B Simplifying Trig Expressions worksheet

Do Now:

Simplify the following expression:

1. $\cos x \tan x$

$\cancel{\cos x} \cdot \frac{\sin x}{\cancel{\cos x}} = \boxed{\sin x}$

2. $\frac{\cot\theta}{\csc^2\theta - 1} = \frac{\cot\theta}{\cot^2\theta} = \frac{1}{\cot\theta}$

$= \boxed{\tan\theta}$

* Pythag. Identity
$1 + \cot^2\theta = \csc^2\theta$
$\cot^2\theta = \csc^2\theta - 1$

3. $\csc\phi \tan\phi + \sec\phi$

$\frac{1}{\cancel{\sin\phi}} \cdot \frac{\cancel{\sin\phi}}{\cos\phi} + \sec\phi$

$= \frac{1}{\cos\phi} + \sec\phi = \sec\phi + \sec\phi$

$= \boxed{2\sec\phi}$

4. $\sin x \cot x$

$\cancel{\sin x} \cdot \frac{\cos x}{\cancel{\sin x}} = \boxed{\cos x}$

5. $\tan x \cos x \sec x$

$= \frac{\sin x}{\cancel{\cos x}} \cdot \cancel{\cos x} \cdot \frac{1}{\cos x}$

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

Recap:

Basic ideas: ***Have your formulas out when doing cw/hw!***

1. Look for identities with same functions and substitute
2. Factor if possible
   a. GCF
   b. perfect squares
   c. difference of squares
   d. trinomials → (   )(   )
3. Rewrite in terms of sine and cosine if possible

Think back.........

Factor the following:

Difference of 2 squares

$9 - y^2$

3 y

$(3+y)(3-y)$

GCF!

$4x^4 - 12x^2$

$4x^2(x^2-3)$

$x^3 - 2x^2 - 4x + 8$ factor By grouping

$x^2(x-2) - 4(x-2)$

$(x^2-4)(x-2)$ Difference of 2 squares

x 2

$(x+2)(x-2)(x-2)$

Simplifying Trig Expressions using Factoring

1) $\sin^2\theta\cos^2\theta + \sin^4\theta$ GCF!

$= \sin^2\theta\,(\underline{\cos^2\theta + \sin^2\theta})$

Pythag. Identity

$= \sin^2\theta\,(1)$

$= \boxed{\sin^2\theta}$

2) $\csc x + \cot^2 x \csc x$

$= \csc x\,(\underline{1 + \cot^2 x})$

Pythag. Identity

$= \csc x\,(\csc^2 x)$

$= \boxed{\csc^3 x}$

3) $\cot^4 y + 2\cot^2 y + 1$ * FACTOR the TRinomial

$= (\underline{\cot^2 y + 1})(\underline{\cot^2 y + 1})$

* Pythag. Id.

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

$= (\csc^2 y)(\csc^2 y)$

$= \boxed{\csc^4 y}$

Simplifying Trig Expressions using Factoring

4) $\dfrac{\cos^2\alpha}{1-\sin\alpha} = \dfrac{1-\sin^2\alpha}{1-\sin\alpha}$ FACTOR

$= \dfrac{(1+\sin\alpha)\cancel{(1-\sin\alpha)}}{\cancel{(1-\sin\alpha)}}$

$= \boxed{1+\sin\alpha}$

5) $\dfrac{(1-\sin\beta)}{(1-\sin\beta)}\cdot\dfrac{1}{1+\sin\beta} + \dfrac{1}{1-\sin\beta}\cdot\dfrac{(1+\sin\beta)}{(1+\sin\beta)}$

$= \dfrac{1-\sin\beta}{(1-\sin\beta)(1+\sin\beta)} + \dfrac{1+\sin\beta}{(1-\sin\beta)(1+\sin\beta)}$

$= \dfrac{1-\sin\beta+1+\sin\beta}{(1-\sin\beta)(1+\sin\beta)} = \dfrac{2}{1-\sin^2\beta}$ *

FOIL

$= \dfrac{2}{\cos^2\beta} = 2\,\dfrac{1}{\cos^2\beta} = \boxed{2\sec^2\beta}$

6) $\sec^3 x - \sec^2 x - \sec x + 1$

$= \sec^2 x(\sec x - 1) - 1(\sec x - 1)$

* $(\sec^2 x - 1)(\sec x - 1)$

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

* Pythag. Identity

7) $\dfrac{(1+\cos x)}{(1+\cos x)}\cdot\dfrac{1+\cos x}{\sin x} + \dfrac{\sin x}{1+\cos x}\cdot\dfrac{\sin x}{\sin x}$

$= \dfrac{(1+\cos x)(1+\cos x)}{(1+\cos x)(\sin x)} + \dfrac{\sin^2 x}{(1+\cos x)(\sin x)}$

$= \dfrac{1+\cos x+\cos x+\cos^2 x}{(1+\cos x)(\sin x)} + \dfrac{\sin^2 x}{(1+\cos x)(\sin x)}$

$= \dfrac{1+2\cos x+\cos^2 x+\sin^2 x}{(1+\cos x)(\sin x)}$

$= \dfrac{1+2\cos x+1}{(1+\cos x)(\sin x)} = \dfrac{2\cos x+2}{(1+\cos x)(\sin x)}$

$= \dfrac{2\cancel{(\cos x+1)}}{\cancel{(1+\cos x)}(\sin x)} = 2\cdot\dfrac{1}{\sin x} = \boxed{2\csc x}$

Your turn........

Simplify the expression:

8) $\dfrac{\sec^2\theta - 1}{\sec\theta - 1}$

$$= \frac{(\sec\theta + 1)\cancel{(\sec\theta - 1)}}{\cancel{(\sec\theta - 1)}}$$

$$= \boxed{\sec\theta + 1}$$

9) $\left(\cos\beta - \sin\beta\right)^2$

$$= (\cos\beta - \sin\beta)(\cos\beta - \sin\beta)$$

$$= \underline{\cos^2\beta} - 2\sin\beta\cos\beta + \underline{\sin^2\beta}$$

$$= \boxed{1 - 2\sin\beta\cos\beta}$$