**PROBLEMS AND SOLUTIONS - VERIFYING TRIGONOMETRIC IDENTITIES**

**Prepared by Ingrid Stewart, Ph.D., College of Southern Nevada**
**Please Send Questions and Comments to ingrid.stewart@csn.edu. Thank you!**

## Problem 1:

Add or subtract the following trigonometric expressions:

(a) $5 \sin x + 3 \sin x$

(b) $7 \sec x - 2 \sec x$

(c) $4 \cos x - 3 \tan x + 6 \cos x + \tan x$

(d) $\dfrac{1}{\sin x} + \dfrac{\tan x}{\cos x}$

(e) $\dfrac{\sec x}{(1 + \cos x)} - \dfrac{\csc x}{(1 + \cos x)}$

(f) $\dfrac{3}{(\tan x + \sec x)} + \dfrac{5}{(\tan x - \sec x)}$

## Problem 2:

Multiply the following trigonometric expressions:

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

(b) $7 \sec x \cdot 2 \sec x$

(c) $8 \sin x \cdot 3 \cos x$

**Problem 3:**

Factor the following trigonometric expressions:

(a) $\sin x \cos x - \sin x$

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

(c) $4\tan^2 x + \tan x - 3$

**Problem 4:**

Change the fraction $\dfrac{\tan x - \cos x}{\cos x}$ to two terms and reduce.

**Problem 5:**

$\dfrac{\tan x + \cot x}{\sec x \csc x}$ can be reduced to a single number. Find this number.

**Problem 6:**

$\dfrac{1 + \tan x}{1 + \cot x}$ can be reduced to a single trigonometric ratio, such as cos(x), sin(x), tan(x), sec(x), csc(x), or cot(x). Find this ratio.

**Problem 7:**

$\sin x + \cot x \cos x$ can be reduced to a single trigonometric ratio, such as cos(x), sin(x), tan(x), sec(x), csc(x), or cot(x). Find this ratio.

**Problem 8:**

$\dfrac{\sin^2 x + \cos x + \cos^2 x}{\cos x(1 + \cos x)}$ can be reduced to a single trigonometric ratio, such as cos(x), sin(x), tan(x), sec(x), csc(x), or cot(x). Find this ratio.

**Problem 9:**

$\dfrac{\sec x - \csc x}{\sec x \csc x}$ can be reduced to a difference of two trigonometric ratios. Find this difference.

SOLUTIONS

You can find detailed solutions below the link for this problem set!

| | | |
|---|---|---|
| 1.a. $8\sin x$ | 1.b. $5\sec x$ | 1.c. $10\cos x - 2\tan x$ |
| 1.d. $\dfrac{\cos x + \sin x \tan x}{\sin x \cos x}$ | 1.e. $\dfrac{\sec x - \csc x}{1 + \cos x}$ | 1.f. $\dfrac{8\tan x + 2\sec x}{\tan^2 x - \sec^2 x}$ |
| 2.a. $\sin^2 x + 2\sin x \cos x + \cos^2 x$ | 2.b. $14\sec^2 x$ | 2.c. $24\sin x \cos x$ |
| 3.a. $\sin x(\cos x - 1)$ | 3.b. $(\sec x - 1)(\sec x + 1)$ | 3.c. $(4\tan x - 3)(\tan x + 1)$ |
| 4. $\dfrac{\tan x}{\cos x} - 1$ or $\dfrac{\sin x}{\cos^2 x} - 1$ | 5. $1$ | 6. $\tan x$ |
| 7. $\csc x$ | 8. $\sec x$ | 9. $\sin x - \cos x$ |