Trig Identities

(1) $\sec x - \tan x \sin x = \dfrac{1}{\sec x}$

B

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

A

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

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

C $\rightarrow$ $\dfrac{\cos^2 x}{\cos x} = \dfrac{1}{\sec x}$

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

A Reciprocal Id

B Quotient Id

C Py Id

D Reciprocal Id

D $\rightarrow$ $\dfrac{1}{\sec x} = \dfrac{1}{\sec x}$

$\boxed{\text{Trig Id \#2}}$

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

$\dfrac{1}{\sin x} + \dfrac{\cos x}{\sin x} = \csc x + \cot x$

(A) →

$\csc x + \dfrac{\cos x}{\sin x} = \csc x + \cot x$

$\csc x + \cot x = \csc x + \cot x$

(B) →

(A) Recip-ocal Id

(B) Quotient Id

$\dfrac{1+\cos x}{\sin x} = \csc x + \cot x$

$= \dfrac{1}{\sin x} + \cot x$

(C) → ← (D)

$= \dfrac{1}{\sin x} + \dfrac{\cos x}{\sin x}$

$= \dfrac{1+\cos x}{\sin x}$

(C) Reciprocal Id

(D) Quotient Id

Trig Id #3

#3 $$\frac{\sec\theta \sin\theta}{\tan\theta + \cot\theta} = \sin^2\theta$$

A $\rightarrow$ $$\frac{\frac{1}{\cos\theta} \cdot \sin\theta}{\tan\theta + \cot\theta} = \sin^2\theta$$

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

B $\rightarrow$

* $$\frac{\frac{\sin\theta}{\cos\theta}}{\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}} \leftarrow C = \sin^2\theta$$

Two methods from here ① combine fractions in denominator
② clear fractions using LCD

Method ① $$\frac{\frac{\sin\theta}{\cos\theta}}{\frac{\sin\theta}{\cos\theta}\frac{\sin\theta}{\sin\theta} + \frac{\cos\theta}{\sin\theta}\frac{\cos\theta}{\cos\theta}} = \sin^2\theta$$

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

$\boxed{\text{Trig Id \#3}}$

method (B)

$$\frac{\dfrac{\sin\theta}{\cos\theta}}{\dfrac{\sin^2\theta+\cos^2\theta}{\sin\theta\cos\theta}} = \sin^2\theta$$

(D)

$$\frac{\dfrac{\sin\theta}{\cos\theta}}{\dfrac{1}{\sin\theta\cos\theta}} = \sin^2\theta$$

$$\frac{\sin\theta}{\cos\theta} \div \frac{1}{\sin\theta\cos\theta} = \sin^2\theta$$

$$\frac{\sin\theta}{\cos\theta} \cdot \frac{\sin\theta\cos\theta}{1} = \sin^2\theta$$

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

$$\sin^2\theta \cdot 1 = \sin^2\theta$$

$$\sin^2\theta = \sin^2\theta$$

(A) Reciprocal Id
(B) Quotient Id
(C) Quotient Id
(D) Py Th Id.

Trig Id # 3 cont

Method (2)

$$* \quad \frac{\frac{\sin\theta}{\cos\theta}}{\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}} = \sin^2\theta$$

LCD = $\cos\theta \sin\theta$

$$\frac{\sin\theta\cos\theta}{\sin\theta\cos\theta} \cdot \frac{\frac{\sin\theta}{\cos\theta}}{\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}} = \sin^2\theta$$

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

$$\frac{\sin^2\theta \cdot \frac{\cos\theta}{\cos\theta}}{\sin^2\theta\,\frac{\cos\theta}{\cos\theta} + \frac{\sin\theta}{\sin\theta}\cos^2\theta} = \sin^2\theta$$

(E) Pyth Id

$$\frac{\sin^2\theta \cdot 1}{\sin^2\theta \cdot 1 + 1 \cdot \cos^2\theta} = \sin^2\theta$$

$$\text{(E)} \rightarrow \frac{\sin^2\theta}{\sin^2\theta + \cos^2\theta} = \frac{\sin^2\theta}{1} = \sin^2\theta$$

Trig Id #4

#4 $\dfrac{\sec\theta}{\cos\theta} - \dfrac{\tan\theta}{\cot\theta} = 1$

$\dfrac{\sec\theta}{1} \cdot \dfrac{1}{\cos\theta} - \dfrac{\tan\theta}{1} \cdot \dfrac{1}{\cot\theta} = 1$

$\sec\theta \cdot \sec\theta - \tan\theta \cdot \tan\theta = 1$

A B

A B Reciprocal Id

$\boxed{\sec^2\theta - \tan^2\theta = 1}$

this has many ways to be completed

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

$\dfrac{\sin^2\theta}{\cos^2\theta} + \dfrac{\cos^2\theta}{\cos^2\theta} = \dfrac{1}{\cos^2\theta}$

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

$1 = \sec^2\theta - \tan^2\theta$ Pyth Id

$\sec^2\theta - \tan^2\theta = 1$

$\dfrac{1}{\cos^2\theta} - \dfrac{\sin^2\theta}{\cos^2\theta} = 1$

C D

$\dfrac{1 - \sin^2\theta}{\cos^2\theta} = 1$

$\dfrac{\cos^2\theta}{\cos^2\theta} = 1$

E

$1 = 1$

C Reciprocal Id

D Quotient I

E Pyth Id

Trig Id ⑤

⑤ $\cos^2 y - \sin^2 y = 1 - 2\sin^2 y$

Method ①

$[1-\sin^2 y] - \sin^2 y = 1 - 2\sin^2 y$

Ⓐ

$1 - 1\sin^2 y - 1\sin^2 y = 1 - 2\sin^2 y$

Ⓐ Py.Th Id $1 - 2\sin^2 y = 1 - 2\sin^2 y$

Method ②

$\cos^2 y - \sin^2 y = 1 - 2\sin^2 y$

$= [\cos^2 y + 1\sin^2 y] - 2\sin^2 y$

Ⓑ

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

$= \cos^2 y - \sin^2 y$

Ⓑ Py Th Id

Trig Id #6

#6 $\csc^2\theta \tan^2\theta - 1 = \tan^2\theta$

$$\frac{1}{\sin^2\theta} \cdot \frac{\tan^2\theta}{1} - 1 = \tan^2\theta$$

A

$$\frac{1}{\sin^2\theta} \cdot \frac{\sin^2\theta}{\cos^2\theta} - 1 = \tan^2\theta$$

$$\frac{\sin^2\theta}{\sin^2\theta} \cdot \frac{1}{\cos^2\theta} - 1 = \tan^2\theta$$

$$1 \cdot \frac{1}{\cos^2\theta} - 1 = \tan^2\theta$$

A Reciprocal Id

$$\boxed{\sec^2\theta - 1 = \tan^2\theta}$$

this is a Pyth Id.

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

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

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

$$[1 + \tan^2\theta] - 1 = \tan^2\theta$$

B

$$\tan^2\theta = \tan^2\theta$$

B Pyth. Id.

Trig Id #7

Method ①

#7 $\dfrac{\sec^2\theta}{\sec^2\theta - 1} = \csc^2\theta$

$$\frac{\sec^2\theta}{1} \cdot \frac{1}{\sec^2\theta - 1} = \csc^2\theta$$

Method ① $\dfrac{1}{\cos^2\theta} \dfrac{1}{(\sec^2\theta - 1)} = \csc^2\theta$

Ⓐ $\dfrac{1}{\cos^2\theta \sec^2\theta - \cos^2\theta} = \csc^2\theta$

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

Ⓑ $\dfrac{1}{\frac{\cos^2\theta}{\cos^2\theta} - \cos^2\theta} = \csc^2\theta$

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

Ⓒ $\dfrac{1}{\sin^2\theta} = \csc^2\theta$

$$\csc^2\theta = \csc^2\theta$$

Ⓐ Reciprocal Id

Ⓑ Reciprocal Id

Ⓒ Py Th Id

Trig Id #7 Method 2

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

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

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

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

$$\tan^2\theta = \sec^2\theta - 1$$

$$\frac{\sec^2\theta}{\tan^2\theta} = \csc^2\theta$$

A

$$\frac{\sec^2\theta}{1} \cdot \frac{1}{\tan^2\theta} = \csc^2\theta$$

$$\sec^2\theta \cdot \cot^2\theta = \csc^2\theta$$

B

D

$$\frac{1}{\cos^2\theta} \cdot \frac{\cos^2\theta}{\sin^2\theta} = \csc^2\theta$$

C

$$\frac{\cos^2\theta}{\cos^2\theta} \cdot \frac{1}{\sin^2\theta} = \csc^2\theta$$

$$1 \cdot \frac{1}{\sin^2\theta} = \csc^2\theta$$

$$\csc^2\theta = \csc^2\theta$$

A Pyth Id

B Reciprocal Id

C Reciprocal Id

D Reciprocal Id

$\boxed{\text{Trig Id \#7}}$

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

$$A \rightarrow \frac{\frac{1}{\cos^2\theta}}{\frac{1}{\cos^2\theta} - 1} = \csc^2\theta$$

We can "clear" the fraction using $\frac{\cos^2\theta}{\cos^2\theta}$

$$\frac{\cos^2\theta}{\cos^2\theta}\;\frac{\left(\frac{1}{\cos^2\theta}\right)}{\left(\frac{1}{\cos^2\theta} - 1\right)} = \csc^2\theta$$

$$\frac{\frac{\cos^2\theta}{\cos^2\theta}}{\frac{\cos^2\theta}{\cos^2\theta} - \cos^2\theta} = \csc^2\theta$$

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

$$B \rightarrow \frac{1}{\sin^2\theta} = \csc^2\theta$$

$$C \rightarrow \csc^2\theta = \csc^2\theta$$

A Reciprocal Id

B Pyth Id

C Reciprocal Id

$\boxed{\text{Trig Id \# 8}}$

#8 $\tan^2 x \sin^2 x = \tan^2 x - \sin^2 x$

A

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

$\tan^2 x - \tan^2 x \cos^2 x = \tan^2 x - \sin^2 x$

$\tan^2 x - \frac{\sin^2 x}{\cos^2 x} \frac{\cos^2 x}{1} = \tan^2 x - \sin^2 x$

B

$\tan^2 x - \frac{\cos^2 x}{\cos^2 x} \cdot \sin^2 x = \tan^2 x - \sin^2 x$

$\tan^2 x - 1 \cdot \sin^2 x = \tan^2 x - \sin^2 x$

$\tan^2 x - \sin^2 x = \tan^2 x - \sin^2 x$

A Pyth Id

B Quotient Id

$\boxed{\text{Trig Id \#8}}$ Method ②

⑧ $\tan^2 x \sin^2 x = \tan^2 x - \sin^2 x$

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

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

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

$$\boxed{\tan^2 x = \sec^2 x - 1}$$

$$\tan^2 x \sin^2 x = \tan^2 x - \sin^2 x$$

Ⓐ $\longrightarrow [\sec^2 x - 1]\sin^2 x = \tan^2 x - \sin^2 x$

$$\sec^2 x \cdot \sin^2 x - \sin^2 x = \tan^2 x - \sin^2 x$$

Ⓑ $\longrightarrow \frac{1}{\cos^2 x} \sin^2 x - \sin^2 x = \tan^2 x - \sin^2 x$

$$\frac{\sin^2 x}{\cos^2 x} - \sin^2 x = \tan^2 x - \sin^2 x$$

Ⓒ $\longrightarrow \tan^2 x - \sin^2 x = \tan^2 x - \sin^2 x$

Ⓐ Pyth Id
Ⓑ Reciprocal Id
Ⓒ Quotient Id

(9) $(\sin\theta + \cos\theta)^2 + (\sin\theta - \cos\theta)^2 = 2$

$\quad\quad\quad\quad$ (I) $\quad\quad\quad\quad\quad\quad\quad\quad\quad$ (II)

(I) $(\sin\theta + \cos\theta)^2 = (\sin\theta + \cos\theta)(\sin\theta + \cos\theta)$

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

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

(II) $(\sin\theta - \cos\theta)^2 = (\sin\theta - \cos\theta)(\sin\theta - \cos\theta)$

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

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

(I) + (II) = 2

(A) $\boxed{\sin^2\theta + \cos^2\theta} + 2\sin\theta\cos\theta$ (I) $+$ (B) $\boxed{\sin^2\theta + \cos^2\theta} - 2\sin\theta\cos\theta$ (II) $= 2$

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

$1 + 1 + 0 = 2$

$2 = 2$

(A) Pyth Id

(B) Pyth Id

(10) $(\sin\theta + \cos\theta)(\tan\theta + \cot\theta) = \sec\theta + \csc\theta$

$\overset{\text{I}}{\sin\theta\tan\theta} + \overset{\text{II}}{\cos\theta\tan\theta} + \overset{\text{III}}{\sin\theta\cot\theta} + \overset{\text{IV}}{\cos\theta\cot\theta} = \sec\theta + \csc\theta$

(I) $\sin\theta \cdot \frac{\sin\theta}{\cos\theta}^{(A)} = \frac{\sin^2\theta}{\cos\theta}$

(II) $\cos\theta \cdot \frac{\sin\theta}{\cos\theta}^{(A)} = \frac{\sin\theta}{1} \cdot \frac{\cos\theta}{\cos\theta} = \sin\theta \cdot 1$
$= \sin\theta$

(III) $\sin\theta \cdot \frac{\cos\theta}{\sin\theta}^{(A)} = \frac{\sin\theta}{\sin\theta} \cdot \frac{\cos\theta}{1} = \cos\theta \cdot 1$

(IV) $\cos\theta \cdot \frac{\cos\theta}{\sin\theta}^{(A)} = \frac{\cos^2\theta}{\sin\theta}$

$\overset{\text{I}}{\frac{\sin^2\theta}{\cos\theta}} + \overset{\text{II}}{\sin\theta} + \overset{\text{III}}{\cos\theta} + \overset{\text{IV}}{\frac{\cos^2\theta}{\sin\theta}} = \sec\theta + \csc\theta$

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

$\frac{\sin^2\theta}{\cos\theta} + \frac{\cos\theta}{1} \cdot \frac{\cos\theta}{\cos\theta} + \frac{\cos^2\theta}{\sin\theta} + \frac{\sin\theta}{1}\frac{\sin\theta}{\sin\theta} = \sec\theta + \csc\theta$

$\frac{\sin^2\theta}{\cos\theta} + \frac{\cos^2\theta}{\cos\theta} + \frac{\cos^2\theta}{\sin\theta} + \frac{\sin^2\theta}{\sin\theta} = \sec\theta \csc\theta$

$\frac{\sin^2\theta + \cos^2\theta}{\cos\theta} + \frac{\sin^2\theta + \cos^2\theta}{\sin\theta} = \sec\theta + \csc\theta$

(10) cont

$$\frac{\sin^2\theta + \cos^2\theta}{\cos\theta} + \frac{\sin^2\theta + \cos^2\theta}{\sin\theta} = \sec\theta + \csc\theta$$

(B) $$\frac{1}{\cos\theta} + \text{(B)} \frac{1}{\sin\theta} = \sec\theta + \csc\theta$$

(C) $$\sec\theta + \frac{1}{\sin\theta} = \sec\theta + \csc\theta$$

$$\boxed{\sec\theta + \csc\theta \overset{\text{(D)}}{=} \sec\theta + \csc\theta}$$

(A) Quotient Id

(B) Pyth Id

(C) Reciprocal Id

(D) Reciprocal Id

11 Method 1

$$\frac{\tan\theta - 1}{\tan\theta + 1} = \frac{1-\cot\theta}{1+\cot\theta}$$

$$\frac{(\tan\theta - 1)}{(\tan\theta + 1)} \cdot \frac{\cot\theta}{\cot\theta} = \frac{1-\cot\theta}{1+\cot\theta}$$

$$\frac{\tan\theta\cot\theta - \cot\theta}{\tan\theta\cot\theta + \cot\theta} = \frac{1-\cot\theta}{1+\cot\theta}$$

$$\frac{\frac{\tan\theta}{1}\cdot\overset{A}{\frac{1}{\tan\theta}} - \cot\theta}{\frac{\tan\theta}{1}\cdot\underset{B}{\frac{1}{\tan\theta}} + \cot\theta} = \frac{1-\cot\theta}{1+\cot\theta}$$

$$\frac{\frac{\tan\theta}{\tan\theta} - \cot\theta}{\frac{\tan\theta}{\tan\theta} + \cot\theta} = \frac{1-\cot\theta}{1+\cot\theta}$$

$$\boxed{\frac{1-\cot\theta}{1+\cot\theta} = \frac{1-\cot\theta}{1+\cot\theta}}$$

A Reciprocal Id

B Reciprocal Id

(11) Method (2)

$$\frac{\tan\theta - 1}{\tan\theta + 1} = \frac{(1 - \cot\theta)}{(1 + \cot\theta)} \cdot \frac{\tan\theta}{\tan\theta}$$

$$= \frac{\tan\theta - \cot\theta \tan\theta}{\tan\theta + \cot\theta \tan\theta}$$

$$= \frac{\tan\theta - \cot\theta \frac{1}{\cot\theta}}{\tan\theta + \cot\theta \frac{1}{\cot\theta}} \quad \begin{matrix} (A) \\ (B) \end{matrix}$$

$$= \frac{\tan\theta - \frac{\cot\theta}{\cot\theta}}{\tan\theta + \frac{\cot\theta}{\cot\theta}}$$

$$= \frac{\tan\theta - 1}{\tan\theta + 1}$$

(A) Recip-rocal Id

(B) Reciprocal Id

12 $$\frac{1-\tan^2 x}{1+\tan^2 x} = 1-2\sin^2 x$$

$$\frac{1-\tan^2 x}{1} \; \frac{1}{1+\tan^2 x} = 1-2\sin^2 x$$

$$\frac{1-\tan^2 x}{1} \; \frac{1}{\sec^2 x} \text{ (A)} = 1-2\sin^2 x$$

$$(1-\tan^2 x)(\cos^2 x) \text{ (B)} = 1-2\sin^2 x$$

$$\cos^2 x - \tan^2 x \cos^2 x = 1-2\sin^2 x$$

$$\cos^2 x - \overset{\text{(C)}}{\frac{\sin^2 x}{\cos^2 x}} \; \frac{\cos^2 x}{1} = 1-2\sin^2 x$$

$$\cos^2 x - \frac{\sin^2 x}{1} \; \frac{\cos^2 x}{\cos^2 x} = 1-2\sin^2 x$$

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

(D) $$1-\sin^2 x - \sin^2 x = 1-2\sin^2 x$$

$$\boxed{1-2\sin^2 x = 1-2\sin^2 x}$$

(A) Pyth Id

(B) Reciprocal Id

(C) Quotient Id

(13) $$\frac{\cos x+1}{\sin^3 x} = \frac{\csc x}{1-\cos x}$$

$$\frac{1+\cos x}{\sin x(\sin^2 x)} = \frac{\csc x}{1-\cos x}$$

$$\frac{1}{\sin x}\cdot\frac{1+\cos x}{\sin^2 x} = \frac{\csc x}{1-\cos x}$$

(A) $$\frac{\csc x}{1}\ \frac{1+\cos x}{\sin^2 x} = \frac{\csc x}{1-\cos x}$$

$$\frac{\csc x}{1}\cdot\frac{1+\cos x}{1-\cos^2 x} = \frac{\csc x}{1-\cos x}$$

(B)

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

(C) $$\frac{\csc x}{1}\cdot\frac{1}{1-\cos x}\cdot\frac{1+\cos x}{1+\cos x} = \frac{\csc x}{1-\cos x}$$

$$\frac{\csc x}{1-\cos x}\cdot 1 = \frac{\csc x}{1-\cos x}$$

$$\boxed{\frac{\csc x}{1-\cos x} = \frac{\csc x}{1-\cos x}}$$

(A) Recip-ca

(B) Pyth Id

(C) DOYS

(13) Method (2)

$$\frac{\cos x+1}{\sin^3 x} = \frac{\csc x}{1-\cos x}$$

$$\frac{1+\cos x}{\sin^3 x} = \frac{\csc x}{1}\cdot\frac{1}{1-\cos x}$$

$$\frac{1+\cos x}{\sin^3 x} = \frac{\csc x}{1}\cdot\frac{1}{1-\cos x}\cdot\frac{(1+\cos x)}{(1+\cos x)}$$

$$= \frac{\csc x}{1}\ \frac{1+\cos x}{1-\cos^2 x} \quad (A)$$

$$= \frac{\csc x}{1}\cdot\frac{1+\cos x}{\sin^2 x} \quad (B)$$

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

(C)

$$= \frac{1+\cos X}{\sin^3 X}$$

(A) DOTS

(B) Pyth Id

(C) Reciprocal

(14) $\csc^4 x - \cot^4 x = \csc^2 x + \cot^2 x$

(A) $(\csc^2 x - \cot^2 x)(\csc^2 x + \cot^2 x) = \csc^2 x + \cot^2 x$

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

(B)

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

(A) DOTS

(B) Pyth Id

(15) $\frac{\tan\theta}{\sec\theta} + \frac{\cot\theta}{\csc\theta} = \sin\theta + \cos\theta$

$\frac{\tan\theta}{1} \cdot \frac{1}{\sec\theta} + \frac{\cot\theta}{1} \cdot \frac{1}{\csc\theta} = \sin\theta + \cos\theta$

$\frac{\sin\theta}{\cos\theta} \cdot \frac{1}{\sec\theta} + \frac{\cot\theta}{1} \cdot \frac{1}{\csc\theta} = \sin\theta + \cos\theta$

(A)

$\frac{\sin\theta}{\cos\theta} \cdot \frac{\cos\theta}{1}$ (B) $+ \frac{\cot\theta}{1} \cdot \frac{1}{\csc\theta} = \sin\theta + \cos\theta$

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

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

(C)

$\sin\theta + \frac{\cos\theta}{\sin\theta} \cdot \frac{1}{\csc\theta} = \sin\theta + \cos\theta$

$\sin\theta + \frac{\cos\theta}{\sin\theta} \cdot \frac{\sin\theta}{1}$ (D) $= \sin\theta + \cos\theta$

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

$\sin\theta + \cos\theta \cdot 1 = \sin\theta + \cos\theta$

$\boxed{\sin\theta + \cos\theta = \sin\theta + \cos\theta}$

(A) Quotient
(B) Reciprocal
(C) Quotient
(D) Reciprocal

(16) $$\frac{\sin y + \tan y}{1 + \sec y} = \sin y$$

$$\frac{\frac{\sin y}{1} + \frac{\sin y}{\cos y}}{1 + \sec y} = \sin y \quad (A)$$

$$\frac{\frac{\sin y}{1} \cdot \frac{\cos y}{\cos y} + \frac{\sin y}{\cos y}}{1 + \sec y} = \sin y$$

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

$$\frac{\boxed{\frac{\sin y(\cos y + 1)}{\cos y}}}{1 + \sec y} = \sin y$$

$$\frac{\boxed{\frac{\sin y(\cos y + 1)}{\cos y}}}{1 + \frac{1}{\cos y}} = \sin y \quad (B)$$

(A) Quotient

(B) Reciprocal

16 cont

$$\frac{\left[\frac{\sin y(\cos y+1)}{\cos y}\right]}{\frac{1}{1}+\frac{1}{\cos y}} = \sin y$$

$$\frac{\left[\frac{\sin y(\cos y+1)}{\cos y}\right]}{\left[\frac{\cos y}{\cos y}\cdot 1+\frac{1}{\cos y}\right]} = \sin y$$

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

$$\frac{\sin y\cdot\left[\frac{\cos y+1}{\cos y}\right]}{1\cdot\left[\frac{\cos y+1}{\cos y}\right]} = \sin y$$

$$\sin y\cdot 1 = \sin y$$

$$\boxed{\sin y = \sin y}$$