Matching WS / Activity

1. $\frac{1}{\cot\theta} + \frac{1}{\tan\theta} = \tan\theta + \cot\theta$ } reciprocal

$= \frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}$ } quotient

$= \frac{\sin\theta}{\sin\theta}\cdot\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}\cdot\frac{\cos\theta}{\cos\theta}$ } common denom.

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

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

$= \boxed{\csc\theta\cdot\sec\theta}$ } reciprocal

2. $\frac{\csc\theta}{\tan\theta+\cot\theta} = \frac{1}{\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}}$ } change all to sine & cosine

$= \frac{1}{\frac{\sin^2\theta}{\sin\theta\cdot\cos\theta} + \frac{\cos^2\theta}{\sin^2\theta}}$ } Common denom (same as in #1)

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

$= \frac{1}{\frac{\sin\theta}{1}}$ → Pythagoream

$= \frac{1}{\sin\theta}\cdot\sin\theta\cdot\cos\theta$ } mult. by reciprocal

$= \boxed{\cos\theta}$

3. $\frac{\sin^2\theta}{\sec^2\theta - 1} = \frac{\sin^2\theta}{\tan^2\theta}$ → Pythagorean

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

$= \sin^2\theta \cdot \frac{\cos^2\theta}{\sin^2\theta}$ } mult. by reciprocal

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

4. $\cos^2\theta - \sin^2\theta \cdot \cos^2\theta = \cos^2\theta(1 - \sin^2\theta)$ → GCF

$= \cos^2\theta(\cos^2\theta)$ → Pythagorean

$= \boxed{\cos^4\theta}$

5. $\frac{\tan\theta}{\csc\theta} + \frac{\sin\theta}{\tan\theta} = \frac{\frac{\sin\theta}{\cos\theta}}{\frac{1}{\sin\theta}} + \frac{\sin\theta}{\frac{\sin\theta}{\cos\theta}}$ } quotient & reciprocal

$= \frac{\sin\theta}{\cos\theta} \cdot \frac{\sin\theta}{1} + \frac{\sin\theta}{1} \cdot \frac{\cos\theta}{\sin\theta}$ } mult. by reciprocal

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

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

$= \frac{1}{\cos\theta}$ → Pythagorean

$= \boxed{\sec\theta}$ → reciprocal

6. $\frac{1-\csc\theta}{\csc\theta} = \frac{1}{\csc\theta} - \frac{\csc\theta}{\csc\theta}$ } separate fraction

$= \boxed{\sin\theta - 1}$ → reciprocal

7. $\sin^2\theta \cot^2\theta + \sin^2\theta = \sin^2\theta(\cot^2\theta + 1)$ → GCF

$= \sin^2\theta(\csc^2\theta)$ → Pythagorean

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

$= \frac{\sin^2\theta}{\sin^2\theta} = \boxed{1}$

8. $\frac{\cos^2\theta}{(1-\sin\theta)} \cdot \frac{(1+\sin\theta)}{(1+\sin\theta)}$ } multiply by "conjugate"

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

$= \frac{\cos^2(1+\sin\theta)}{\cos^2\theta}$ → Pythagorean

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