HW3 - Simplifying & Verifying Practice

① $\sec\theta\cos\theta$

$\frac{1}{\cos\theta} \cdot \frac{\cos\theta}{1}$

1

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

$\frac{1}{\cos^2\theta}$

$\sec^2\theta$

③ $\frac{\csc\theta}{\sin\theta} - \frac{\cot\theta}{\tan\theta}$

$\frac{\frac{1}{\sin\theta}}{\sin\theta} - \frac{\frac{\cos\theta}{\sin\theta}}{\frac{\sin\theta}{\cos\theta}}$

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

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

$\frac{\sin^2\theta}{\sin^2\theta}$

1

④ $\frac{\sec^2\theta-1}{\sec^2\theta}$ ← Pythag ID

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

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

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

$\sin^2\theta$

⑤ $\frac{\sin\theta+\tan\theta}{1+\sec\theta}$

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

CD: $\cos\theta$

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

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

keep, change, flip

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

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

GCF $\frac{\sin\theta(\cos\theta+1)}{\cancel{\cos\theta+1}}$

$\sin\theta$

(6) $\cot\theta \sin\theta$

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

$\boxed{\cos\theta}$

(7) $\frac{\csc\theta - \sin\theta}{\csc\theta}$

$\frac{\csc\theta}{\csc\theta} - \frac{\sin\theta}{\csc\theta}$

$1 - \frac{\sin\theta}{\frac{1}{\sin\theta}}$

$1 - \sin^2\theta$

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

(8) $\cos\theta + \tan\theta\sin\theta$

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

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

CD: $\cos\theta$

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

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

$\frac{1}{\cos\theta}$ $\sec\theta$

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

$\cdot \sin x$

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

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

$\frac{\cos^2 x}{\sin x} = \frac{\cos^2 x}{\sin x}$ ✓

(10) $\frac{1}{\sec\theta\tan\theta} = \csc\theta - \sin\theta$

$\frac{1}{\sec\theta} \cdot \frac{1}{\tan\theta} = \csc\theta - \sin\theta$

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

$\cos\theta \cdot \frac{\cos\theta}{\sin\theta} = \csc\theta - \sin\theta$

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

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

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

$\csc\theta - \sin\theta = \csc\theta - \sin\theta$ ✓

(11) $\csc\theta(\csc\theta+\cot\theta) = \frac{1}{1-\cos\theta} \cdot \frac{(1+\cos\theta)}{(1+\cos\theta)}$ trig conjugate

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

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

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

$\csc\theta(\csc\theta+\cot\theta) = \csc^2\theta + \frac{1}{\sin\theta}\cdot\frac{\cos\theta}{\sin\theta}$

$\csc\theta(\csc\theta+\cot\theta) = \csc^2\theta + \csc\theta\cot\theta$

$\csc\theta(\csc\theta+\cot\theta) = \csc\theta(\csc\theta+\cot\theta)$ ✓

(12) $\frac{\tan^2\theta}{1+\sec\theta} = \sec\theta - 1$

trig conjugate $\frac{1-\sec\theta}{1-\sec\theta} \cdot \frac{\tan^2\theta}{1+\sec\theta} = \sec\theta - 1$

$\frac{\tan^2\theta(1-\sec\theta)}{1-\sec^2\theta} = \sec\theta - 1$

$\frac{\tan^2\theta(1-\sec\theta)}{-\tan^2\theta} = \sec\theta - 1$

$-1(1-\sec\theta) = \sec\theta - 1$

$\sec\theta - 1 = \sec\theta - 1$ ✓

(13) $\frac{\sec\theta}{\cos\theta} - \frac{\tan\theta}{\cot\theta} = 1$

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

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

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

$1 = 1$

(14) $\sec\theta\csc\theta = \tan\theta + \cot\theta$

$\sec\theta\csc\theta = \frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}$ CD: $\cos\theta\sin\theta$

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

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

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

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

$\sec\theta\csc\theta = \sec\theta\csc\theta$ ✓