1.

$$\csc x \ \ \sin x + \cos x$$

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

$$\frac{\sin x}{\sin x} + \frac{\cos x}{\sin x}$$

$$1 + \cot x$$

2.

$$\sin^2 x + \sin^2 x \cot^2 x$$

$$\sin^2 x \ \ 1 + \cot^2 x$$

$$\sin^2 x \csc^2 x$$

$$\sin^2 x \left(\frac{1}{\sin^2 x} \right)$$

$$1$$

3.

$$\frac{\sin x + \cos x}{\sin x} - \frac{\cos x - \sin x}{\cos x}$$

$$\left(\frac{\cos x}{\cos x} \right) \left(\frac{\sin x + \cos x}{\sin x} \right) - \left(\frac{\cos x - \sin x}{\cos x} \right) \left(\frac{\sin x}{\sin x} \right)$$

$$\frac{\cos x \sin x + \cos^2 x - \cos x \sin x + \sin^2 x}{\cos x \sin x}$$

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

$$\frac{1}{\cos x \sin x}$$

$$\frac{1}{\cos x} \left(\frac{1}{\sin x} \right)$$

$$\sec x \csc x$$

4.

$$\tan \theta \csc \theta = \sec \theta$$

$$\frac{\sin \theta}{\cos \theta} \left(\frac{1}{\sin \theta} \right)$$

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

$$\sec \theta$$

5.

$$1 + \tan^2 u \quad 1 - \sin^2 u \ \ = 1$$

$$1 - \sin^2 u + \tan^2 u - \tan^2 u \sin^2 u = 1$$

$$\cos^2 u + \tan^2 u \ \ 1 - \sin^2 u \ \ = 1$$

$$\cos^2 u + \tan^2 u \cos^2 u = 1$$

$$\cos^2 u \ \ 1 + \tan^2 u \ \ = 1$$

$$\cos^2 u \sec^2 u = 1$$

$$\cos^2 u \left(\frac{1}{\cos^2 u} \right) = 1$$

6.

$$1+\sec^2 x\sin^2 x=\sec^2 x$$
$$1+\left(\frac{1}{\cos^2 x}\right)\sin^2 x=\sec^2 x$$
$$1+\left(\frac{\sin^2 x}{\cos^2 x}\right)=\sec^2 x$$
$$1+\tan^2 x=\sec^2 x$$
$$\sec^2 x=\sec^2 x$$

7.

$$\cos\left(\frac{3\pi}{2}-\theta\right)=-\sin\theta$$
$$\cos\frac{3\pi}{2}\cos\theta+\sin\frac{3\pi}{2}\sin\theta=-\sin\theta$$
$$(0)\cos\theta+\ -1\ \sin\theta=-\sin\theta$$
$$-\sin\theta=-\sin\theta$$

8.

$$\frac{\cos\ \alpha+\beta}{\cos\alpha\sin\beta}=\cot\beta-\tan\alpha$$
$$\frac{\cos\alpha\cos\beta-\sin\alpha\sin\beta}{\cos\alpha\sin\beta}=\cot\beta-\tan\alpha$$
$$\frac{\cos\alpha\cos\beta}{\cos\alpha\sin\beta}-\frac{\sin\alpha\sin\beta}{\cos\alpha\sin\beta}=\cot\beta-\tan\alpha$$
$$\frac{\cos\beta}{\sin\beta}-\frac{\sin\alpha}{\cos\alpha}=\cot\beta-\tan\alpha$$
$$\cot\beta-\tan\alpha=\cot\beta-\tan\alpha$$

9.

$$\sin\ \alpha-\beta\ \cos\ \alpha+\beta\ =\sin\alpha\cos\alpha-\sin\beta\cos\beta$$
$$(\sin\alpha\cos\beta-\sin\beta\cos\alpha)(\cos\alpha\cos\beta-\sin\alpha\sin\beta)=\sin\alpha\cos\alpha-\sin\beta\cos\beta$$
$$\sin\alpha\cos\alpha\cos^2\beta-\sin^2\alpha\sin\beta\cos\beta-\cos^2 a\sin\beta\cos\beta+\sin\alpha\cos\alpha\sin^2\beta$$
$$\sin\alpha\cos\alpha\cos^2\beta+\cos\alpha\sin\alpha\sin^2\beta-\sin\beta\cos\beta\sin^2\alpha-\sin\beta\cos\beta\cos^2 a$$
$$\sin\alpha\cos\alpha\left(\cos^2\beta+\sin^2\beta\right)\sin\beta\cos\beta\left(\sin^2\alpha+\cos^2\alpha\right)$$
$$\sin\alpha\cos\alpha-\sin\beta\cos\beta$$