Verifying Trig Identities:

- Work with one side of the equation only (the more complicated side)
- Look for opportunities to **FACTOR, ADD FRACTIONS, SEPARATE A FRACTION, MULTIPLY BY THE CONJUGATE**
- Look for opportunities to use the **Fundamental Trig Identities**
- When all else fails, try converting all terms into sin/cos.

Examples:

$\sin\theta + \cot\theta\cos\theta = \csc\theta$

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

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

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

$\dfrac{\cos\theta}{1-\sin\theta} = \sec\theta + \tan\theta$

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

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

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

$$= \sec\theta + \tan\theta$$

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

common denominator to add fractions

FOIL

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

FOIL

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

Identity!

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

$$=2\csc\theta$$

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

$$\frac{\cos\theta(\sin\theta+\cos\theta)}{\sin\theta\cos\theta}-\frac{\sin\theta(\cos\theta-\sin\theta)}{\sin\theta\cos\theta}$$

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

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

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

$$1\cdot\csc\theta\sec\theta$$