

Here are some techniques to try when working with trigonometric identities.

## Convert Everything to Sine and Cosine

When in doubt, convert everything to sines and cosines.

$$\text{Example: } \sec \theta \cot \theta \Rightarrow \frac{1}{\cos \theta} + \frac{\cos \theta}{\sin \theta}$$

## Multiply by Conjugate

When you see  $(1 \pm \text{thingy})$  in the numerator or denominator of a fraction, try multiplying top and bottom by the conjugate.

$$\text{Example: } \frac{1 + \sin \theta}{\cos \theta} \Rightarrow \frac{1 + \sin \theta}{\cos \theta} \frac{1 - \sin \theta}{1 - \sin \theta} \Rightarrow \frac{1 - \sin^2 \theta}{\cos \theta (1 - \sin \theta)} \Rightarrow \frac{\cos^2 \theta}{\cos \theta (1 - \sin \theta)}$$

## Split Fractions

If you have a **sum or difference in the numerator** of a fraction, try splitting the fraction in two.

$$\text{Example: } \frac{1 + \sin \theta \cos \theta}{\cos \theta} \Rightarrow \frac{1}{\cos \theta} + \frac{\sin \theta \cos \theta}{\cos \theta}$$

## Combine Fractions

If you have the **sum or difference of two fractions**, try combining them over a common denominator.

$$\text{Example: } \frac{1}{\cos \theta} + \frac{1}{\sin \theta} \Rightarrow \frac{\sin \theta + \cos \theta}{\cos \theta \sin \theta}$$

## Factor When Possible

Remember your **factoring** skills: take out common factors, watch for differences of squares, etc.

$$\text{Example: } \frac{\sin \theta - \sin^3 \theta}{\cos \theta} \Rightarrow \frac{\sin \theta (1 - \sin^2 \theta)}{\cos \theta} \Rightarrow \frac{\sin \theta \cos^2 \theta}{\cos \theta}$$

$$\text{Example: } \frac{\sin^2 \theta - \cos^2 \theta}{\sin \theta + \cos \theta} \Rightarrow \frac{(\sin \theta - \cos \theta)(\sin \theta + \cos \theta)}{\sin \theta + \cos \theta}$$