What if  $\alpha$  and  $\beta$  are equal?

$$sin(\alpha + \alpha) = sinacos a + cos a sina$$

$$2sinacos a$$

$$\cos(\alpha + \alpha) = \cos \alpha \cos \alpha - \sin \alpha \sin \alpha$$

$$\cos^2 \alpha - \sin^2 \alpha$$

Pythagorean Identities:

$$\sin^2\theta + \cos^2\theta = 1$$
  $| + \cot^2\theta = \csc^2\theta + \tan^2\theta + | = \sec^2\theta$ 

Sum & Difference Identities:

$$\cos(\alpha \pm \beta) = \cos\alpha\cos\beta \mp \sin\alpha\sin\beta$$
  
 $\sin(\alpha \pm \beta) = \sin\alpha\cos\beta \pm \cos\alpha\sin\beta$ 

Double Angle:

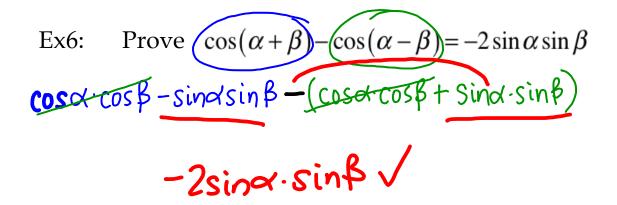
$$\sin(2\theta) = 2\sin\theta \cdot \cos\theta$$

$$\cos(2\theta) = \cos^2\theta - \sin^2\theta$$

$$\cos(2\theta) = 1 - 2\sin^2\theta$$

$$\cos(2\theta) = 2\cos^2\theta - 1$$

$$\cos(2\theta) = 2\cos^2\theta - 1$$



Ex7: Prove 
$$\cos\left(x - \frac{\pi}{3}\right) + \cos\left(x + \frac{\pi}{3}\right) = \cos x$$
  
 $\cos x \cdot \cos \frac{\pi}{3} + \sin x \cdot \sin \frac{\pi}{3} + \cos x \cos \frac{\pi}{3} - \sin x \cdot \sin \frac{\pi}{3}$   
 $2\cos x \cdot \cos \frac{\pi}{3}$   
 $2 \cdot \frac{1}{2} \cdot \cos x$   
 $\cos x \cdot \cos x$ 

Ex8: Prove 
$$\frac{\tan \theta}{1 + \sec \theta} + \frac{1 + \sec \theta}{\tan \theta} + \frac{2 \csc \theta}{\tan \theta}$$

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

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

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

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

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

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

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

$$\frac{2\sec \theta}{\tan \theta} = \frac{\cos \theta}{\sin \theta}$$

$$\frac{2}{\sin \theta} = 2\csc \theta$$

$$\frac{2\csc \theta}{\sin \theta} = 2\csc \theta$$