Warm - Up

Prove: $\dfrac{\sin\theta}{1+\cos\theta} + \dfrac{1+\cos\theta}{\sin\theta} = 2\csc\theta$

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

$$\frac{\sin^2\theta + 1 + \cos\theta + \cos\theta + \cos^2\theta}{\sin\theta\,(1+\cos\theta)}$$

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

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

$$2\csc\theta$$

SWBAT find values not on the unit circle without a calculator using sum and difference identities

Agenda:

- Warm - Up
- Check/Go over bookwork HW
- Sum/Difference Identities

HW Book page 468 #1 - 21 odd and 51, 58

Proving Cosine of a Sum or Difference

Just Joking
Were not Doing it!!!

$$\cos(u \pm v) = \cos(u)\cos(v) \mp \sin(u)\sin(v)$$

Example:

Find the exact value of $\cos(15^\circ)$ without using a calculator

$$\cos(45-30)$$

$$\cos(45)\cos(30)+\sin(45)\sin(30)$$

$$\frac{\sqrt{2}}{2}\cdot\frac{\sqrt{3}}{2}+\frac{\sqrt{2}}{2}\cdot\frac{1}{2}$$

$$\frac{\sqrt{6}}{4}+\frac{\sqrt{2}}{4}$$

$$\frac{\sqrt{6}+\sqrt{2}}{4}$$

Example 2:
Prove the identity $\cos\left(\frac{\pi}{2} - x\right) = \sin(x)$

$\cos\left(\frac{\pi}{2}\right)\cos(x) + \sin\left(\frac{\pi}{2}\right)\sin x$

$0 \cdot \cos(x) + 1 \cdot \sin x$

$\sin x$

Sine of a Sum or Difference

$$\sin(u \pm v) = \sin(u)\cos(v) \pm \cos(u)\sin(v)$$

Write the following expression as the sine or cosine of an angle:

$\sin(x)\sin(2x) - \cos(x)\cos(2x)$

$-(\cos(x)\cos(2x) - \sin(x)\sin(2x))$

$-\cos(x+2x)$

$-\cos(3x)$

Tangent of a Difference or Sum

$$\tan(u \pm v) = \frac{\tan u \pm \tan v}{1 \mp \tan u \tan v}$$

Example:

Prove the reduction formula: $\tan\left(\theta - \frac{3\pi}{2}\right) = -cot\theta$

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

$$\frac{\sin\theta\cos\frac{3\pi}{2} - \sin\frac{3\pi}{2}\cos\theta}{\cos\theta\cos\frac{3\pi}{2} + \sin\theta\sin\frac{3\pi}{2}}$$

$$\frac{\cancel{\sin\theta\cdot 0} + +1\cdot\cos\theta}{\cancel{\cos\theta\cdot 0} - 1\cdot\sin\theta} \qquad -\cot\theta$$

$\sin 3u = 3\cos^2 u \sin u - \sin^3 u$

$\sin(u+2u)$

$\sin u \cos 2u + \sin 2u \cos u$

$\sin u \cos(u+u) + \sin(u+u)\cos u$

$\sin u(\cos u \cdot \cos u - \sin u \sin u)$

$(\sin u \cdot \cos u + \sin u \cos u)\cos u$

$\cos^2 u \sin u - \sin^3 u + \cos^2 u \sin u + \cos^2 u \sin u$

$3\cos^2 u \sin u - \sin^3 u$