Tonight's Homework!!!!

p.468(5,6,7,12,23),

p.475(16,18,40)

Going over homework..........

16. $$\frac{1}{\sec^2 x} + \frac{1}{\csc^2 x} = 1$$

$$\cos^2 x + \sin^2 x = 1$$

$$1 = 1$$

$$\frac{(1+\sin x)\,1}{(1+\sin x)(1-\sin x)} = \sec^2 x + \sec x \tan x$$

$$\frac{1+\sin x}{1-\sin^2 x} =$$

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

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

$$\sec^2 x + \frac{\sin x}{\cos x}\cdot\frac{1}{\cos x} =$$

$$\sec^2 x + \tan x \sec x = \checkmark$$

28. $$\frac{\sec^2 x - 6\tan x + 7}{\sec^2 x - 5} = \frac{\tan x - 4}{\tan x + 2}$$

$$\frac{1 + \tan^2 x - 6\tan x + 7}{1 + \tan^2 - 5} = \frac{\tan x - 4}{\tan x + 2}$$

$x^2 - 6x + 8$

$$\frac{\tan^2 x - 6\tan x + 8}{\tan^2 x - 4} = \frac{\tan x - 4}{\tan x + 2}$$

$$\frac{(\tan x - 4)\cancel{(\tan x - 2)}}{(\tan x + 2)\cancel{(\tan x - 2)}} = \frac{\tan x - 4}{\tan x + 2}$$

$$\frac{\tan x - 4}{\tan x + 2} = \frac{\tan x - 4}{\tan x + 2}$$

10. $\cot^2 x \csc^2 x - \cot^2 x = \cot^4 x$

$\cot^2 x(\csc^2 x - 1) = \cot^4 x$

$\cot^2 x \cot^2 x = \cot^4 x$

$\cot^4 x = \cot^4 x$

34. $$\frac{1+\sin x+\cos x}{1-\sin x+\cos x}=\frac{1+\sin x}{\cos x}$$

$$\cos x+\cos x\sin x+\cos^2 x=(1+\sin x)($$

$$\cos x+\cos x\sin x+\cos^2 x=1-\cancel{\sin x}+\cos x+\cancel{\sin x}-\sin$$

$$\cos x+\cos x\sin x+\cos^2 x=1+\cos x-\sin^2 x+\sin x\cos x$$

$$\cos x+\cos x\sin x+\cos^2 x=\cos^2 x+\cos x+\sin x\cos x$$

12. $\sec^4 x - \tan^4 x = 1 + 2\tan^2 x$

22) $$\frac{\ldots\sin x)\;\; 1+\sin x}{\ldots\sin x)(1-\sin x)} = 2\sec^2 x + 2\sec x\tan x - 1$$

$$\frac{1+2\sin x+\sin^2 x}{1-\sin^2 x} =$$

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

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

$$\sec^2 x + 2\frac{\sin x}{\cos x}\cdot\frac{1}{\cos x} + \tan^2 x =$$

$$\sec^2 x + 2\tan x\sec x + \tan^2 x =$$

$$\sec^2 x + 2\tan x\sec x + \sec^2 x - 1 =$$

$$2\sec^2 x + 2\tan x\sec x - 1 =$$

27

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

$$\frac{1+2\sin x+\sin^2 x}{1-\sin^2 x} =$$

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

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

$$\sec^2 x + \frac{2\sin x}{\cos x}\cdot\frac{1}{\cos x} + \tan^2 x =$$

$$\boxed{\sec^2 x} + 2\tan x\sec x + \tan^2 x =$$

$$\sec^2 x + 2\tan x\sec x + \sec^2 x - 1 =$$

$$2\sec^2 x + 2\tan x\sec x - 1 =$$

6. $\cos^2 x + \tan^2 x \cos^2 x = 1$

$$\cos^2 x + \frac{\sin^2 x}{\cancel{\cos^2 x}} \cdot \frac{\cancel{\cos^2 x}}{1} = 1$$

$$\cos^2 x + \sin^2 x = 1$$

$$1 = 1$$

10. $\cot^2 x \csc^2 x - \cot^2 x = \cot^4 x$

$\cot^2 x(\csc^2 x - 1) = \cot^4 x$

$\cot^2 x \; \cot^2 x = \cot^4 x$

$\cot^4 x = \cot^4 x$

$x^2 y^2 - x^2$

$x^2(y^2 - 1)$

28. $$\frac{\sec^2 x - 6\tan x + 7}{\sec^2 x - 5} = \frac{\tan x - 4}{\tan + 2}$$

$$\frac{1 + \tan^2 x - 6\tan x + 7}{1 + \tan^2 x - 5} =$$

$$\frac{\tan^2 x - 6\tan x + 8}{\tan^2 x - 4} =$$

$$x^2 - 6x + 8$$

$$\frac{(x-4)(x-2)}{x^2 - 4}$$

$$\frac{(\tan x - 4)\cancel{(\tan x - 2)}}{\cancel{(\tan x - 2)}(\tan x + 2)} =$$

$$\frac{\tan x - 4}{\tan x + 2} =$$

30 $\quad \dfrac{\sec^3 x - \cos^3 x}{\sec x - \cos x} = \sec^2 x + 1 + \cos^2 x$

$x^3 - y^3$

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$$\frac{\cancel{(\sec x - \cos x)}(\sec^2 x + \sec x(\cos x) + \cos^2 x)}{\cancel{\sec x - \cos x}}$$

$$\sec^2 x + \cancel{\sec x} \cdot \frac{1}{\cancel{\sec x}} + \cos^2 x =$$

$$\sec^2 x + 1 + \cos^2 x =$$

Sum & Difference Identities

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

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

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

Ex Find the exact value.

A. $\sin(75°)$; addition

$$\sin(\underset{u}{30°}+\underset{v}{45°}) = \sin 30° \cos 45° + \sin 45° \cos 30°$$

$$= \left(\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right) + \left(\frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{3}}{2}\right)$$

$$= \boxed{\frac{\sqrt{2}}{4} + \frac{\sqrt{6}}{4}} \text{ or } \frac{\sqrt{2}+\sqrt{6}}{4}$$

B. $\cos\left(\frac{\pi}{6}\right)$; subtraction

30°

90° − 60°

60° − 30°

360° − 330°

150° − 120°

30° − 0°

$$\cos\left(\overset{u}{\frac{5\pi}{6}} - \overset{v}{\frac{2\pi}{3}}\right) =$$

$$\cos\frac{5\pi}{6}\cos\frac{2\pi}{3} + \sin\frac{5\pi}{6}\sin\frac{2\pi}{3}$$

$$\left(-\frac{\sqrt{3}}{2}\right)\left(-\frac{1}{2}\right) + \left(\frac{1}{2}\right)\left(\frac{\sqrt{3}}{2}\right)$$

$$\frac{\sqrt{3}}{4} + \frac{\sqrt{3}}{4}$$

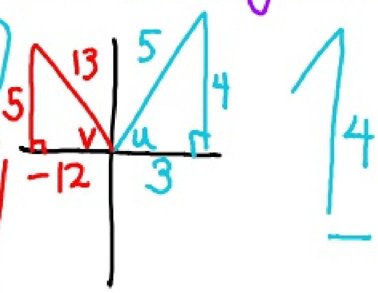
$$\frac{\cancelto{1}{2}\sqrt{3}}{\cancelto{2}{4}}$$

$$\frac{\sqrt{3}}{2}$$

Ex Find the exact value of $\tan(u+v)$ given

$\boxed{\sin u = \frac{4}{5}\frac{o}{h},\quad 0 < u < \frac{\pi}{2}}$

$\boxed{\cos v = \frac{-12}{13}\frac{a}{h},\quad \frac{\pi}{2} < v < \pi}$



$$\tan(u+v) = \frac{\tan u + \tan v}{1 - \tan u \tan v}$$

$$\frac{\frac{4\cdot 4}{4\cdot 3} - \frac{5}{12}}{1 - \left(\frac{4}{3}\right)\left(-\frac{5}{12}\right)}$$

$$\frac{\frac{16-5}{12}}{\frac{36}{36} + \frac{20}{36}}$$

$$\frac{\frac{11}{12}}{\frac{56}{36}}$$

$$\frac{11}{\cancel{12}_{\,1}} \cdot \frac{\cancel{36}^{\,3}}{56}$$

$$\frac{33}{56}$$

Prove: $\cos\left(\overset{u}{\frac{\pi}{2}} - \overset{v}{\theta}\right) = \sin\theta$

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

$0 \cdot \cos\theta + 1 \cdot \sin\theta = \sin\theta$

$0 + \sin\theta = \sin\theta$

$\sin\theta = \sin\theta$

The Double ∠ identities

$\sin(2u) = 2\sin u \cos u$

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

$= 1 - 2\sin^2 u$

$= 2\cos^2 u - 1$

$\tan(2u) = \dfrac{2\tan u}{1 - \tan^2 u}$

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

$1 - \sin^2 u - \sin^2 u$

$1 - 2\sin^2 u$

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

$\cos^2 u - (1 - \cos^2 u)$

$2\cos^2 u - 1$

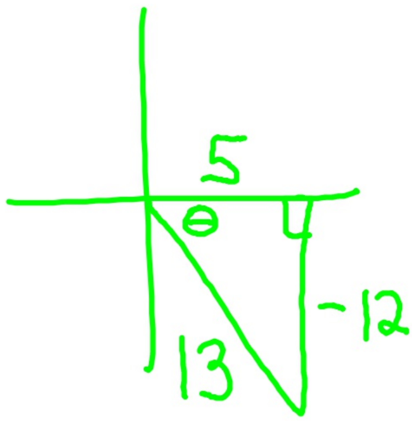
Ex Given: $\cos\theta = \frac{5}{13}\,\frac{a}{h}$; $\frac{3\pi}{2} < \theta < 2\pi$

A) find $\sin(2\theta)$

$$\sin(2\theta) = 2\overbrace{\sin\theta}^{\frac{o}{h}}\,\overbrace{\cos\theta}^{\frac{a}{h}}$$

$$= 2\left(\frac{-12}{13}\right)\left(\frac{5}{13}\right)$$

$$\boxed{\sin(2\theta) = \frac{-120}{169}}$$



Half ∠ Formulas

$$\sin\left(\frac{u}{2}\right) = \pm\sqrt{\frac{1-\cos 2u}{2}}$$

$$\cos\left(\frac{u}{2}\right) = \pm\sqrt{\frac{1+\cos 2u}{2}}$$

$$\tan\left(\frac{u}{2}\right) = \frac{1-\cos u}{\sin u} = \frac{\sin u}{1+\cos u}$$

choose btwn +/− based on Quadrant of $\frac{u}{2}$.