Proving Identities (6.3) p314 day 5

$\sin^2 x$ $\sin 2x + \sin x$

female brain $2\sin x = \sin x + \sin x$

male brain $2\sin x\cos x$

Proving Identities (6.3) p314 day 5

HW: p306#5cd identities 10, 12

5. Simplify each expression to a single primary trigonometric function.

a) $\frac{\sin 2\theta}{2\cos\theta}$

b) $\cos 2x\cos x + \sin 2x \sin x$

c) $\frac{\cos 2\theta + 1}{2\cos\theta}$

d) $\frac{\cos^3 x}{\cos 2x + \sin^2 x}$

$$\frac{\cos^3 x}{\cos^2 - \cancel{\sin^2 x} + \cancel{\sin^2 x}}$$

$$= \frac{\cos^3 x}{\cancel{\cos^2 x}}$$

$$= \cos x$$

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10. $LS = \dfrac{1-\sin^2\theta}{\frac{1}{\sin^2\theta} - 1}$

$$= \frac{\cancel{1-\sin^2\theta}}{\frac{\cancel{1-\sin^2\theta}}{\sin^2\theta}}$$

$$= \sin^2\theta$$

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12. $LS = \dfrac{\sin^2 x}{\cos^2 x} - \sin^2 x$

$$= \frac{\sin^2 x - \sin^2 x\cos^2 x}{\cos^2 x}$$

$$= \frac{\sin^2 x(1-\cos^2 x)}{\cos^2 x}$$

$RS = \sin^2 \cdot \dfrac{\sin^2 x}{\cos^2 x}$

$$\frac{\sin^4 x}{\cos^2 x}$$

Proving Identities (6.3) p314 day 5

ex1: Prove that $1-\sin^2 x = \sin x\cos x\cot x$

$LS = \cos^2 x$

$RS = \cancel{\sin x}\cos x \cdot \dfrac{\cos x}{\cancel{\sin x}}$

$= \cos^2 x$

$LS = RS$

QED

Proving Identities II (6.3) p314 day 6

ex2: Prove that $\dfrac{1}{1+\sin x} = \dfrac{\sec x - \sin x\sec x}{\cos x}$

$LS = \dfrac{1}{1+\sin x}$

$RS = \dfrac{\sec x(1-\sin x)}{\cos x}$

$$= \frac{\frac{1}{\cos x}(1-\sin x)}{\cos x} \quad \cdot \frac{1}{\cos x}$$

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

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

$$= \frac{\cancel{1-\sin x}}{\cancel{(1-\sin x)}(1+\sin x)} \quad \text{diff sq.}$$

$$= \frac{1}{1+\sin x}$$

$LS = RS$

QED

Proving Identities (6.3) p314 day 5

ex3: Prove that $\cot x - \csc x = \dfrac{\cos 2x - \cos x}{\sin 2x + \sin x}$

$LS = \dfrac{\cos x}{\sin x} - \dfrac{1}{\sin x}$

$= \dfrac{\cos x - 1}{\sin x}$

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

$= \dfrac{2\cos^2 x - \cos x - 1}{\sin x(2\cos x + 1)}$

$= \dfrac{(\cos x - 1)\cancel{(2\cos x + 1)}}{\sin x\cancel{(2\cos x + 1)}}$

$= \dfrac{\cos x - 1}{\sin x}$

$LS = RS$
QED

check $(a-1)(2a+1)$
$= 2a^2 - a - 1$ ✓

Proving Identities (6.3) p314 day 5

1ab
3ab
2a
4

Proving Identities (6.3) p314 day 5

HW: p314#1c, 2b, 3c, 7a

quiz tomorrow

1.c) $\dfrac{\sin x\cos x - \sin x}{\cos^2 x - 1}$ ← diff of squares

$= \dfrac{\sin x\cancel{(\cos x - 1)}}{(\cos x + 1)\cancel{(\cos x - 1)}}$

$\boxed{= \dfrac{\sin x}{\cos x + 1}}$

1.b) $\dfrac{\cos^2 x - \cos x - 2}{6\cos x - 12}$

$m-2$
$a-1$
$-2, +1$

$= \dfrac{\cancel{(\cos x - 2)}(\cos x + 1)}{6\cancel{(\cos x - 2)}}$

$\boxed{= \dfrac{\cos x + 1}{6}}$

3.b) $\dfrac{1}{(\sin x - 1)} + \dfrac{1}{(\sin x + 1)} \dfrac{(\sin x - 1)}{\sin x - 1}$

$= \dfrac{\sin x + 1}{(\sin x - 1)(\sin x + 1)} + \dfrac{\sin x - 1}{(\sin x - 1)(\sin x + 1)}$

$(a+1)(a-1)$
$a^2 - 1$

$= \dfrac{\sin x + \cancel{1} + \sin x - \cancel{1}}{(\sin^2 x - 1)}$

$\boxed{= \dfrac{2\sin x}{\sin^2 x - 1}}$

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

2.b)

$LS = \frac{\sin^2 x - \cos^2 x}{\sin x + \cos x}$ ← diff. sq. $RS = \sin x - \cos x$

$= \frac{(\sin x - \cos x)\cancel{(\sin x + \cos x)}}{\cancel{\sin x + \cos x}}$

$= \sin x - \cos x$

$LS = RS$

QED

2. a) $\cos x + \cos x \tan^2 x = \sec x$

$LS = \cos x \left(1 + \tan^2 x\right)$ $RS = \frac{1}{\cos x}$

$= \cos x \cdot \sec^2 x$

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

$= \frac{1}{\cos x}$

$LS = RS$

QED

8.a) $\cos 75^\circ$ —   30 45 60   90

$= \cos(30^\circ + 45^\circ)$

$= \cos 30^\circ \cos 45^\circ - \sin 30^\circ \sin 45^\circ$

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

$\vdots$

$\sin\frac{\pi}{3}\cos\frac{\pi}{4} - \sin\frac{\pi}{4}\cos\frac{\pi}{3}$ —

$= \sin\left(\frac{\pi}{3} - \frac{\pi}{4}\right)$

$= \boxed{\sin\frac{\pi}{12}}$

test to see if it's an identity

$\frac{\cos\theta + \sin\theta}{\cos\theta} = \tan\theta$ $\theta = 60^\circ$

$LS = \frac{\cos 60^\circ + \sin 60^\circ}{\cos 60^\circ}$ — $RS = \tan 60^\circ$

$= \frac{\frac{1}{2} + \frac{\sqrt{3}}{2}}{\frac{1}{2}}$ — $= \frac{\sqrt{3}}{1}$

$= \frac{\frac{1+\sqrt{3}}{\cancel{2}}}{\frac{1}{\cancel{2}}} = 1 + \sqrt{3}$ $= \sqrt{3}$

$LS \neq RS$

it is not an identity