IDENTITIES WORKSHEET

Thursday, February 27, 2014 2:28 PM

42) $\frac{1}{\sin\theta} - \sin\theta = \cot\theta\cos\theta$

LHS. Find Common Denominator:

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

$$\frac{\cos^2\theta}{\sin\theta} =$$

$$\frac{\cos\theta}{\sin\theta}\cdot\cos\theta =$$

$$\cot\theta\cos\theta = \checkmark$$

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

LHS: FOIL

$$\sec^2\alpha - 2\tan\alpha\sec\alpha + \tan^2\alpha =$$

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

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

Factor

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

$$\frac{(1-\sin\alpha)^2}{(1+\sin\alpha)(1-\sin\alpha)} =$$

$$\frac{}{(1+\sin\alpha)(1-\sin\alpha)}$$

$$\frac{1-\sin\alpha}{1+\sin\alpha} = \checkmark$$

48) $\dfrac{\sin B}{1+\cos B} + \dfrac{1+\cos B}{\sin B} = 2\csc B$

$$\frac{\dfrac{\sin^2 B}{\sin B(1+\cos B)}}{} + \frac{(1+\cos B)^2}{\sin B(1+\cos B)} =$$

$$\frac{\sin^2 B + 1 + 2\cos B + \cos^2 B}{\sin B(1+\cos B)} =$$

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

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

$$\frac{2}{\sin B} =$$

$$2\csc B = \checkmark$$

49) $\sin A + \cos A = \dfrac{\sin A}{1-\cot A} - \dfrac{\cos A}{\tan A - 1}$

RHS:

$$= \frac{\sin A}{\sin A - \cos A} - \frac{\cos A}{\sin A - \cos A}$$

$$= \frac{\quad}{\frac{\sin A}{\sin A} - \frac{\cos A}{\sin A}} - \frac{\quad}{\frac{\sin A}{\cos A} - \frac{\cos A}{\cos A}}$$

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

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

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

✓ $= \sin A + \cos A$

50) $(1 - \cos C)(1 + \sec C) = \tan C \sin C$

LHS:

$1 - \cos C + \sec C - 1 =$

$-\cos C + \frac{1}{\cos C} =$

$\frac{-\cos^2 C + 1}{\cos C} =$

$\frac{\sin^2 C}{\cos C} =$

$\frac{\sin C}{\cos C} \cdot \sin C =$

$\tan C \sin C =$ ✓

52) $\dfrac{2\sin^3\beta}{1-\cos\beta} = 2\sin\beta + 2\sin\beta\cos\beta$

$\dfrac{2\sin\beta\sin^2\beta}{1-\cos\beta} =$

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

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

$2\sin\beta(1+\cos\beta) =$

$2\sin\beta + 2\sin\beta\cos\beta =$ ✓

OR mult. by conj:

$\dfrac{2\sin^3\beta(1+\cos\beta)}{1-\cos^2\beta} =$

$\dfrac{2\sin^3\beta(1+\cos\beta)}{\sin^2\beta} =$

$2\sin\beta(1+\cos\beta) =$

$2\sin\beta + 2\sin\beta\cos\beta =$ ✓

53) $\dfrac{\sin^3\theta + \cos^3\theta}{\sin\theta + \cos\theta} = 1 - \sin\theta\cos\theta$

LHS: Factor: Sum of Cubes!

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

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

$1 - \sin\theta\cos\theta =$ ✓