Simplifying Trig Identities

Algebra Review

① Factor: $3y+6 \rightarrow \boxed{3(y+2)}$

② Combine: $\frac{3^{(2)}}{5_{(2)}} + \frac{x^{(5)}}{2_{(5)}} \rightarrow \boxed{\frac{6+5x}{10}}$

③ $\frac{3^{(x-1)}}{x+1_{(x-1)}} - \frac{2^{(x+1)}}{x-1_{(x+1)}} \rightarrow \frac{3x-3-2x-2}{(x+1)(x-1)} = \boxed{\frac{x-5}{x^2-1}}$

④ Factor: $4x^2-36$

$4(x^2-9) \rightarrow \boxed{4(x+3)(x-3)}$

A trig expression is SIMPLIFIED when it is written in as few terms as possible (ideally one term.) No fractions left in simplified answer.

① $\cos x \cdot \tan x$

* Try to put in terms of sinx and cosx.

$\frac{\cancel{\cos x}}{1} \cdot \frac{\sin x}{\cancel{\cos x}}$

$= \boxed{\sin x}$

(2) $\frac{\csc x}{\sec x} = \frac{\frac{1}{\sin x}}{\frac{1}{\cos x}} = \frac{1}{\sin x} \cdot \frac{\cos x}{1} = \frac{\cos x}{\sin x}$

$\downarrow$

$\boxed{\cot x}$

(3) $1 - \cos^2 x = \boxed{\sin^2 x}$

(4) $\csc x - \cos x \cdot \cot x$

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

$\downarrow$

$\boxed{\sin x}$

(5) $\sin x + \cot x \cdot \cos x$

$\frac{(\sin x)\sin x}{(\sin x)\,1} + \frac{\cos x \cdot \cos x}{\sin x} = \frac{\sin^2 x + \cos^2 x}{\sin x} = \frac{1}{\sin x}$

$\downarrow$

$\boxed{\csc x}$

(6) $\cos^2 x + \cos^2 x \cdot \tan^2 x$

$\cos^2 x\,(1 + \tan^2 x) = \cos^2 x\,(\sec^2 x)$

$\frac{\cancel{\cos^2 x}}{1}\left(\frac{1}{\cancel{\cos^2 x}}\right) = \boxed{1}$

⑦ $$\frac{1\,(1-\sin\theta)}{(1-\sin\theta)\,1+\sin\theta} + \frac{1\,(1+\sin\theta)}{1-\sin\theta\,(1+\sin\theta)}$$

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

$$= \boxed{2\sec^2\theta}$$

⑧ $$\frac{1\,(\sec x-1)}{(\sec x-1)\sec x+1} - \frac{1\,(\sec x+1)}{\sec x-1\,(\sec x+1)}$$

$$\frac{\cancel{\sec x}-1-\cancel{\sec x}-1}{\sec^2 x-1} \rightarrow \frac{-2}{\tan^2\theta}$$

$$\downarrow$$

$$-2\cdot\frac{1}{\tan^2\theta} = \boxed{-2\cot^2\theta}$$