Simplifying Trig Expressions Using Identities

1. Factor each of the following:

A) $1 - \cos^2\theta$ B) $1 - \sin^2\theta$ C) $\sin^2\theta - \cos^2\theta$

D) $\sin\alpha - \sin^2\alpha$ E) $\tan^2\alpha - \cot^2\alpha$ F) $\sec^2\theta - 1$

2. Express each of the following in terms of $\sin\theta$ or $\cos\theta$, or both.

A) $\dfrac{1}{\sec\theta}$ B) $\sin^2\theta + \dfrac{1}{\sec^2\theta}$ C) $\cos\theta\dfrac{1}{\sec\theta}$

D) $\tan\theta\cos\theta$ E) $1 - \csc^2\theta$ F) $\dfrac{1 + \cot^2\theta}{\cot^2\theta}$

3. Write each of the following in terms of $\cos\theta$.

A) $\sin^2\theta$ B) $\cos^2\theta$ C) $\cot^2\theta$ D) $\tan^2\theta$

E) $\cot\theta\sin\theta$ F) $\tan\theta\sin\theta$ G) $\dfrac{\csc\theta}{\cot^2\theta}$ H) $\cot\theta\csc\theta$

4. Express each of the following in terms of $\sin\theta$ or $\cos\theta$, or both.

A) $\tan\theta\sec\theta$ B) $\dfrac{\csc^2\theta}{\cot^2\theta}$ C) $1 + \tan^2\theta$ D) $1 + \cot^2\theta$

E) $\dfrac{\tan\theta}{1 + \tan\theta}$ F) $\dfrac{\cot\theta}{1 + \cot\theta}$ G) $\sec^2\theta - \tan^2\theta$ H) $\dfrac{1 + \tan\theta}{\sec\theta}$

5. Write each of the following in simpler form (this means to write in terms of one of the primary ratios)

A) $\sin\theta\cot\theta$ B) $\sin\theta + \dfrac{\cos^2\theta}{\sin\theta}$ C) $\sin^2\theta + \sin^2\theta\cot^2\theta$

D) $\cos^3\theta + \sin^2\theta\cos\theta$ E) $\cot\theta\sec\theta\sin\theta$ F) $(\sin\theta + \cos\theta)^2 - 2\sin\theta\cos\theta$

6. Write each of the following in simpler form (this means to write in terms of one of the primary ratios)

A) $\sin\left(x + \dfrac{\pi}{3}\right) - \cos\left(x + \dfrac{\pi}{6}\right)$ B) $\sin\left(x + \dfrac{\pi}{6}\right) + \cos\left(x + \dfrac{\pi}{3}\right)$

C) $\sin\left(\dfrac{3x}{7}\right)\cos\left(\dfrac{4x}{7}\right) + \cos\left(\dfrac{3x}{7}\right)\sin\left(\dfrac{4x}{7}\right)$ D) $\cos(a - b) - \cos(a + b)$

e) $\sin(a + \pi) - \sin(\pi - a)$