3. **Multiply** then use the Fundamental Trig Identities to simplify the expressions. FOIL

a. $(\sin x + \cos x)^2$

b. $(\cot x + \csc x)(\cot x - \csc x)$

$\cot^2 x + \cancel{\cot x \csc x} - \cancel{\cot x \csc x} - \csc^2 x$

$\cot^2 x - \csc^2 x = \cot^2 x - (1 + \cot^2 x) = \underline{-1}$

c. $(\sec x + 1)(\sec x - 1)$

d. $(3 - 3\sin x)(3 + 3\sin x)$

$9 + \cancel{9\sin x} - \cancel{9\sin x} - 9\sin^2 x$

$9 - 9\sin^2 x = 9(1 - \sin^2 x) = \underline{9\cos^2 x}$

4. **Add or Subtract** then use the Fundamental Trig Identities to simplify the expressions.

a. $\dfrac{1}{1+\cos\sigma} + \dfrac{1}{1-\cos\sigma}$

$\dfrac{\sec\alpha - 1}{\sec\alpha - 1} \cdot$ b. $\dfrac{1}{\sec\alpha + 1} - \dfrac{1}{\sec\alpha - 1} \cdot \dfrac{\sec\alpha + 1}{\sec\alpha + 1}$

$\dfrac{\sec\alpha - 1}{\sec^2\alpha - 1} - \dfrac{\sec\alpha + 1}{\sec^2\alpha - 1} = \dfrac{-2}{\sec^2\alpha - 1} = \dfrac{-2}{\tan^2\alpha}$

$= \underline{-2\cot^2\alpha}$

$\dfrac{1-\sin\phi}{1-\sin\phi} \cdot$ c. $\dfrac{\cos\phi}{1+\sin\phi} + \dfrac{1+\sin\phi}{\cos\phi} \cdot \dfrac{\cos\phi}{\cos\phi}$

$\dfrac{\tan\mu}{\tan\mu} \cdot$ d. $\tan\mu - \dfrac{\sec^2\mu}{\tan\mu}$

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

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

$= \dfrac{1 - \cancel{\sin\phi} + 1 + \cancel{\sin\phi}}{\cos\phi}$

$\underline{2\sec\phi} = \dfrac{2}{\cos\phi}$

5. Use the trig substitution to rewrite the function as a trig function of θ, where $0° < \theta < 90°$.

a. $\sqrt{25 - x^2}$ $\quad x = 5\sin\theta$

b. $\sqrt{16 - x^2}$ $\quad x = 4\cos\theta$

$\sqrt{25 - (5\sin\theta)^2} = \sqrt{25 - 25\sin^2\theta}$

$5\cos\theta = \sqrt{25\cos^2\theta} = \sqrt{25(1 - \sin^2\theta)} =$

c. $\sqrt{x^2 - 9}$ $\quad x = 3\sec\theta$

d. $\sqrt{x^2 + 100}$ $\quad x = 10\tan\theta$

$\sqrt{(10\tan\theta)^2 + 100} = \sqrt{100\tan^2\theta + 100}$

$\underline{10\sec\theta} = \sqrt{100\sec^2\theta} = \sqrt{100(\tan^2\theta + 1)} =$