$$\sin(-x) = -\frac{1}{3}$$

$$-\sin x = -\frac{1}{3}$$

$$\sin x = \frac{1}{3}$$

$$\tan x = -\frac{\sqrt{2}}{4}$$

$$\tan x = \frac{\sin x}{\cos x}$$

$$-\frac{\sqrt{2}}{4} = \frac{1}{3}$$

$$\frac{\cos x}{\sqrt{2}} = \frac{1}{3}$$

$$\cos x = \frac{1}{3} \left(-\frac{4}{\sqrt{2}}\right) = -\frac{4}{3\sqrt{2}} = \frac{-4\sqrt{2}}{6} = -\frac{2\sqrt{2}}{3}$$

$$\csc x = \frac{1}{\sin x} = 3$$

$$\sec x = \frac{1}{\cos x} = \frac{-3\sqrt{2}}{4}$$

$$\cot x = \frac{1}{\tan x} = -\frac{4}{\sqrt{2}} = -\frac{2\sqrt{2}}{2\sqrt{2}} = \frac{2}{2} = 1$$
5.1 #35

\[
\sec \alpha \cdot \frac{\sin \alpha}{\tan \alpha} = \frac{\sin \alpha}{\cos \alpha} \cdot \frac{\sin \alpha}{\cos \alpha} \cdot \frac{1}{\cos \alpha} = 1
\]

\[
\tan \alpha = \frac{\sin \alpha}{\cos \alpha}
\]
\[ \tan \theta = 2 \]
\[ \csc \theta = -\frac{1}{2} \]
\[ \sin \theta < 0 \]

\[ \sin \theta = -\frac{2}{\sqrt{5}} = -\frac{2\sqrt{5}}{5} \]
\[ \cos \theta = -\frac{1}{\sqrt{5}} = -\frac{\sqrt{5}}{5} \]
\[ \csc \theta = -\frac{\sqrt{5}}{2} \]
\[ \sec \theta = -\sqrt{5} \]

\[ r = \sqrt{(-2)^2 + (-1)^2} = \sqrt{5} \]
\[ \frac{\cos^2 y}{1 - \sin y} \]

\[ \frac{1 - \sin^2 y}{1 - \sin y} \]

\[ \frac{1 - \sin y}{1 + \sin y} \]

\[ \frac{(1 - \sin y)(1 + \sin y)}{1 + \sin y} \]

\[ \sin^2 u + \cos^2 u = 1 \]

\[ \cos^2 u = 1 - \sin^2 u \]
5.1B Using Fundamental Identities

Factor and simplify

\[ \sin^4 x - \cos^4 x \]

\[ (\sin^2 x - \cos^2 x)^2 \]

\[ (\sin^2 x - \cos^2 x)(\sin^2 x + \cos^2 x) \]

\[ \sin^2 x - \cos^2 x \]

\[ \sin^2 x - (1 - \sin^2 x) \]

\[ 2\sin^2 x - 1 \]

\[ a^2 - b^2 = (a-b)(a+b) \]

\[ \sin^2 u + \cos^2 u = 1 \]

\[ \cos^2 u = 1 - \sin^2 u \]
multiply and simplify

\[(2 \csc x + 2)(2 \csc x - 2)\]

\[4 \csc^2 x - 4 \csc x + 4 \csc x - 4\]

\[4 \csc^2 x - 4\]

\[4(\csc^2 x - 1)\]

\[4(\cot^2 x + 1 - 1)\]

\[4 \cot^2 x\]

\[\cot^2 x \pm 1 = \csc^2 x\]
Simplify

\[
\frac{\cos x \cdot \cos x}{(1 + \sin x) \cdot \cos x} + \frac{(1 - \sin x)(1 + \sin x)}{(\cos x)(1 + \sin x)}
\]

\[
\frac{\cos^2 x}{(1 + \sin x) \cdot \cos x} + \frac{1 + 2 \sin x + \sin^2 x}{(1 + \sin x) \cdot \cos x}
\]

\[
\frac{1 - \sin^2 x + 1 + 2 \sin x + \sin^2 x}{(1 + \sin x) \cdot \cos x}
\]

\[
\frac{2 + 2 \sin x}{(1 + \sin x) \cdot \cos x}
\]

\[
\frac{2}{\cos x} \cdot \frac{1 + \sin x}{2 \sec x}
\]
Rewrite not as a fraction

\[
\frac{3(\sec x + \tan x)}{(\sec x - \tan x)(\sec x + \tan x)}
\]

\[
= \frac{3(\sec x + \tan x)}{\sec^2 x - \tan^2 x}
\]

\[
= \frac{1}{1 + \tan^2 x}
\]

\[
= \frac{1}{\sec^2 x - \tan^2 x}
\]
Use trig substitution

\[ x = 3 \sec \theta \]

\[
\sqrt{x^2 - 9} = \sqrt{(3 \sec \theta)^2 - 9} = \sqrt{9 \sec^2 \theta - 9} = \sqrt{9 (\sec^2 \theta - 1)} = \sqrt{9 \tan^2 \theta} = 3 \tan \theta
\]

\[ 1 + \tan^2 u = \sec^2 u \]
\[ \tan^2 u = \sec^2 u - 1 \]