Section 7.1
Solutions and Hints

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for the book:
<u>Precalculus, Mathematics for Calculus 4th Edition</u>
by James Stewart, Lothar Redlin and Saleem Watson.

40. Verify the identity.
Notice the right hand side involves sec x and tan x, both of which have cos x as their denominator. So if we could get the denominator of the left hand side to be something equal to cos x (or maybe $\cos^2 x$) we would likely be on the right path.

LHS $= \dfrac{1-\sin x}{1+\sin x}$, multiply by "one"
(because we want $1 - \sin^2 x$ as the denominator)

$= \dfrac{1-\sin x}{1+\sin x} * \dfrac{1-\sin x}{1-\sin x}$, simplify

$= \dfrac{1-2\sin x+\sin^2 x}{1-\sin^2 x}$, notice $1 - \sin^2 x = \cos^2 x$

$= \dfrac{1-2\sin x+\sin^2 x}{\cos^2 x}$, break stuff up into 3 fractions (all same denom)

$= \dfrac{1}{\cos^2 x} - \dfrac{2\sin x}{\cos^2 x} + \dfrac{\sin^2 x}{\cos^2 x}$, simplify by using identities

$= \sec^2 x - 2 * \dfrac{1}{\cos x} * \dfrac{\sin x}{\cos x} + \tan^2 x$, continue simplifying

$= \sec^2 x - 2 * \sec x * \tan x + \tan^2 x$, now factor

$= (\sec x - \tan x) * (\sec x - \tan x)$

$= (\sec x - \tan x)^2$ = RHS

LHS = RHS, so we are done.

44. Verify the identity.

Notice that as stuff is in the form $A^{\text{even power}} - B^{\text{even power}}$,
it is likely we can factor stuff and get nice things to happen:

LHS $= \sin^4\theta - \cos^4\theta$
$= (\sin^2\theta - \cos^2\theta)(\sin^2\theta + \cos^2\theta)$, apply identity $1 = (\sin^2\theta + \cos^2\theta)$
$= (\sin^2\theta - \cos^2\theta)*1$
$= (\sin^2\theta - \cos^2\theta)$ = RHS

LHS = RHS so we are done.