Disproving Identities

In section 8.3, the textbook gives a number of examples showing how to establish an identity. Recall that an equation $f(x) = g(x)$ is an identity if it is true for *all* values of x for which both functions f and g are defined. Thus, such an equation is *not* an identity if there is at least one value of x for which $f(x) \neq g(x)$.

Therefore, to disprove a proposed identity $f(x) = g(x)$, it is enough to find one value of x for which the equation is false. This can usually be done fairly easily with a little trial and error.

EXAMPLE: Consider the equation $\cos^2 x - \sin^2 x = 1$. This equation is actually true at some values of x, for example at $x = 0, \pi, 2\pi, \ldots$. However, the equation is false at most values of x. For example, at $x = \pi/2$, the left side is -1 and the right side is of course 1. Since $-1 \neq 1$, this is a false identity. Many other choices of x could also be used to disprove this false identity.